Reviewed inside Ultimate's NIGHTSHADE!
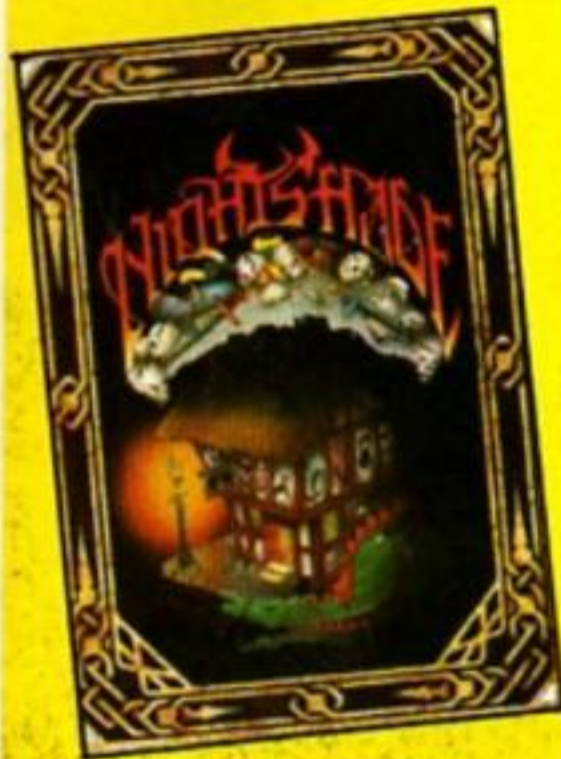
plus 4 pages of software reviews

RUPERT

25 new games and special prizes to be won in our QUICKSILVA competition

Life and death Amstrad style

Amstrad have launched a new computer—the PCW8256—aimed at the small business market and simultaneously announced that the CPC664 is "well and truly dead" just five months after it was unveiled.

The PCW8256 includes a 256K computer/word processor, monitor with a built-in disc drive, and printer. The package will retail for £399 and Dixons, the only high street outlet selling the machine before Christmas, say it will be on their shelves by the last week of September.

The bad news for home users is that the new machine has no game playing capability and is not compatible with the CPC464 or CPC664.

The introduction of Amstrad's CPC128 in this country after its American launch in May has been conspicuously unpublicised. The 128K machine has a built-in disc drive, CP/M plus and compatibility with most CPC464/664 software and add-ons. The green screen model will cost £299 and the colour monitor version £399.

From September 2nd the Amstrad 464 will be £199, green screen, and £299 for the colour version. Both models will come with a 12 pack of software.

There are no future plans for the CPC664 which was only launched five months ago. "It is well and truly dead," said Amstrad's managing director Alan Sugar at the official launch of the PCW8256. "It has suffered from a leap in technology," he added.

"Amstrad's aim with the PCW8256," said Alan, "was to produce a word processor/personal computer that will completely revolutionise the office equipment and word processor market. Amstrad believe in giving customers what they want."

What buyers of the CPC664 feel now that their machine has been both superceded and ditched after such a short lifespan remains to be seen.

One disgruntled 664 owner contacted HCW to complain about Amstrad launching the 664 in April, "when it is now obvious the 6128 was completed."

Amstrad now seem set to assault the small business user market with the same pricing and packaging strategy that has up to now brought them success in the home micro market. "The new PCW8256 is not a toy or a gimmick," asserted Mr Sugar.

The PCW8256—open for business

No fanfare for the CPC6128

Soapbox

One of the most difficult problems when parting with money for new games software is finding out how good it is.

Obviously, the first thing to do is to read the reviews in HCW, new releases are covered very quickly. Even so, as recent Soapboxes point out, they are only one, albeit experienced, person's view. You might, on the other hand, see it on a friend's machine, but you won't be the first with the new release will you?

Full marks therefore to Boots, the high street chain, with their new in-store computer game video. Not only is the software chart provided, but also, presumably sponsored by the publishers, a series of commercials featuring excerpts from the games themselves, so you can actually see what you're getting before you buy, without having to rely on the sleeve artwork and descriptions which are often over flattering to the product.

Perhaps it will also mean an end to the poor conversions we see which feature another machine's screen-shots on the cover too. Well done Boots! But keep it accurate and up to date please.   **D.M. (Reviewer)**

Teaching begins at home

Home Tutor is a novel idea from Fearless Software which allows you to learn the joys of computing from home — with access to an advisory service and personal consultation.

The course comprises 12 modules each taking a month to complete and written in multi-ability fashion. Starting with vocabulary of command, the courses progress through machine code and assembler language to advanced information handling.

Not only can you add to the exercises and projects that come with Home Tutor but you also have an in-built refresher course whereby you can re-examine information already covered.

Home Tutor (Information Pack), Mailcom, Clarke Rd, Mount Farm, Milton Keynes, MK1 1HQ.

Interface Upgrade

Technology Research will be launching Beta Plus an upgraded Spectrum Beta Disc Interface with full file handling — and a Magic Button.

This little button enables tape based programs to be rapidly transferred to floppy disc systems and means that Spectrum cassette software is fully compatible with the Beta Disc system.

The upgrading charge for existing Beta Interfacer users is £19.95 plus £4.00 P&P.

Technology Research, Unit 18, Central Trading Est, Staines, Middx.

The Rocky History Show

The Natural History Museum are reaping the benefits of modern technology as they explore the geological past.

In a permanent exhibition which opens in October, the museum will be unearthing how we depend on geological resources in aspects of our everyday life. You will be able to see rooms from an ordinary house which have been chopped in half to expose their contents, structure and inner mechanisms.

By pressing coloured keys you can discover, for example, where limestone and nickel come in handy in the kitchen. An extensive resource bank has been set up using microcomputers linked to laser discs allowing visitors access to a wealth of information — and what's more admission to the exhibition is free.

British Museum (Natural History), Cromwell Rd, London SW7 5BD.

MSX addition

The new HX-22 MSX computer was the star attraction at the recent Toshiba launch.

The HX-22 has 144K of memory — 80k RAM and 64k ROM — and has the added feature of a built-in word processor function. It also comprises a step sculpture keyboard, two ROM cartridge slots and an RGB output for a high resolution monitor.

Toshiba's HX-10 put in an appearance as the winner of ITV's Database poll. The HX-10 can be up-graded to give all the features of the HX-22 — which will be available from October.

Toshiba, Toshiba Hse, Frimley Rd, Camberely, Surrey.
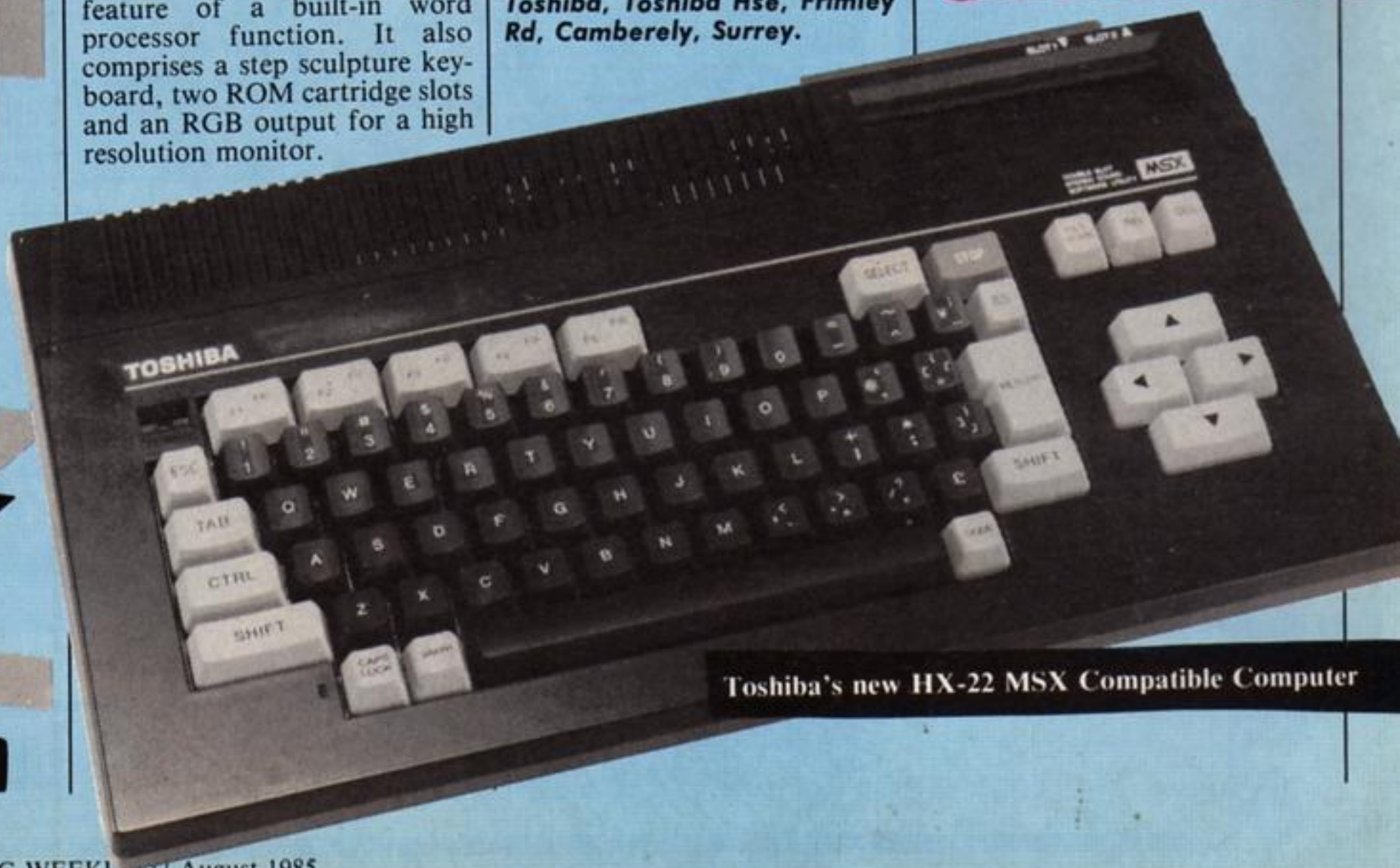
Toshiba's new HX-22 MSX Compatible Computer

Amstrad in the school-room

As from September, Bootle High School, Merseyside, will be the first to benefit from the new Amstrad educational network system.

The school will have 10 Amstrads linked up to a file-store and printer on site with a similar set-up on the second site. The network, originally designed for mainframe computers, works on a ring principle and up to 120 stations can be used on one ring and several rings can then be linked by gateways.

What it means for schools like Bootle High is that they can network from existing micro-computers and share expensive disc and printer resources.

Pupils at Bootle High using the Amstrad network

Points of view

To support the Prestel Education scheme Tecmedia has released Micro Viewdata — an offline simulation for the BBC micro.

Users will be able to create viewdata frames, display them as if from a viewdata service and employ all the features of a Prestel system — screen layout, routing structures and page/frame numbering.

Micro Viewdata costs £32.06, but UK schools pay the subsidised price of £21.64.

Tecmedia, 5 Granby St, Loughborough, LE11 3DU.

Eastern Promise

It does seem unfair that the majority of computer shows are held in this great metropolis called London — and therefore out of reach for many of you.

However there is a growing number of computer fairs and shows outside London and it's worth keeping an eye on the local press for details.

The First East of England Computer Fair is a case to hand. To be held at the Creuset Centre Peterborough on the 11th November, the fair will house displays, demonstrations and competitions with a heavy emphasis on local participation.

East of England Enterprises, 24 West Stonebridge, Orton, Malbourne, Peterborough.

Write-on

Whether you're planning your first Mills and Boon's best-seller or compiling the school-magazine there are a wealth of computer-based aids to help plan and condense your ideas.

Innovative Software's Scratchpad is half word-processor, half spreadsheet, so that ideas are entered only once, can be edited and re-positioned and then different structures can be tried out with simple icon driven commands.

Available through mail order only. Scratchpad costs £24.95.

Innovative Software, 41 Walter Rd, Swansea, W. Glamorgan.

Tecmedia's Micro Viewdata pack

Today's releases, software in the pipeline, software on the drawing board — all bound for the home micro

Shorts

The woods are full of heroes this week. Rambo, the Sylvester Stallone character who eats Sherman tanks for breakfast will soon be cutting his way through the micro-jungle in an adventure from Ocean and Robin Hood the Sherwood Forest-based bandit with a soft spot for the poor, will be bounding through the leafy glades in Adventure International's **Robin of Sherwood, The Touchstone of Rhiannon.**

Ocean snapped up the rights to **Rambo First Blood Part II** and the game is expected to be available for the Spectrum (£7.95) in September followed by C64 and Amstrad versions (£8.95) a month later.

Rambo nicknamed affectionately as "the mean killing machine" is a Vietnam veteran who has to fight his way through the jungles of South East Asia to rescue American prisoners of war. Ocean's director Jon Woods, said, "The story-line provides enormous scope for computer graphic scenarios — scenes like the 'slime pit' when Rambo dangles over a mud pit will make a superb arcade sequence."
Robin of Sherwood — Touchstone of Rhiannon is based on the TV series of the same name and is available for the Spectrum C64 and Amstrad versions as a graphic adventure (£9.95) and for the BBC and Electron as a text only adventure (£7.95).
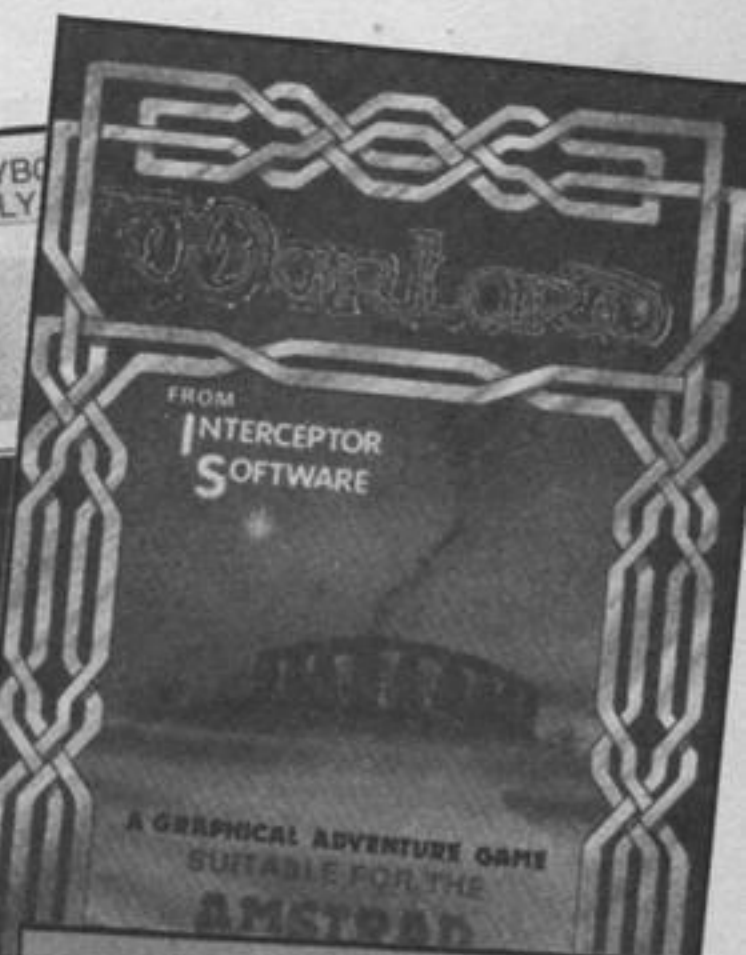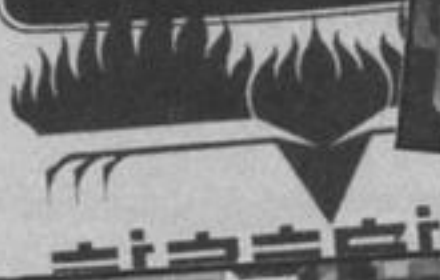
Interceptor takes us back to the time when woad was all the rage with their adventure called **Warlord.** You take the part of the Celt's champion who has to fight it out single handed with the Roman's top centurion to decide the future fate of England. Warlord, set in the mythical realms of the first century AD is available for the Amstrad and C64 (£8.99).

Cylu, Firebird's latest release for the C64 and Spectrum casts you as the Warrior King in a land called Evol. To prove your worthiness to lead the populace you have to find the 24 objects concealed within the maze.

The maze of London's streets is the basis of a text adventure for the Spectrum from Friday-soft (£4.95 or £6.75 for the microdrive version). Guaranteed by its makers to be free of goblins and dragons, **London Adventure** incorporates over a hundred of the capitals' locations for those who want a little realism in their micro-explorations.

Bored of the Rings, the text adventure that uses such mysterious settings as Berkwood and the River Anadin to parody Tolkeins famous trilogy is to be available in an expanded version from Silversoft with many new locations and graphic scenes. To be released on September 16th for Spectrum and BBC (£7.95) Bored of The Rings promises to solve the riddle of the disappearing C-5's.

Taskset have announced their first sortie into text adventures with graphics this autumn with the release of **Souls of Darkon** on September 12. Initially available on the Amstrad, (£8.90) C64 and Spectrum versions will follow. On the planet Megron, evil is everywhere and you are set the task of freeing the hyper-intelligent inhabitants from the curse of Darkon.

Atari owners can add **Chop Suey** to their gaming menu from August 29th when English Software release their Kung Fu game with the following ingredients: one/two player option, "Pow" strength gauges and "surprise hazards of the scorpion variety". Chop Suey costs £8.95 and £12.95 (disc) and is compatible with the Atari 400/800/XL/XE computers with 48K or more.

A crop of conversions for the Amstrad this week including **Scrabble** from Leisure Genius (£9.95 and £12.95 (disc) and **A View To A Kill**,Domark's Bondathon which in the new version has the four games in a different order. A View to A Kill costs £10.99 and £12.99 (disc).

Gremlin has announced three Amstrad conversions — **Project Future**, a 256 screen arcade adventure, **Rocco**, a boxing simulation and **Wanted: Monty Mole**. All will retail at £8.95.

CYLU — '48K SPECTRUM KEYBOARD ONLY

WARLORD FROM INTERCEPTOR SOFTWARE — A GRAPHICAL ADVENTURE GAME SUITABLE FOR THE AMSTRAD

CHOP SUEY — ENGLISH SOFTWARE

ROBIN OF SHERWOOD — Touchstones of Rhiannon — SPECTRUM 48K WITH GRAPHICS Cassette £9.95

Ebb and Flow

There are plenty of waves being made at Ocean about their new releases.

The vast majority are licenced products from televison and film sources. They have even licenced a toy!

Linked releases for the period from now to Christmas include **Transformers**, based on the toy which is both a robot and a car or plane, **Night Rider** a follow up to Streethawk, **Krypton Factor** which will include the commando test, **Never Ending Story** from the German fantasy film, **''V''** the cult sci-fi programme on ITV and **Rambo** as mentioned elsewhere.

There will also be three, as yet un-named, releases before Christmas, one arcade game, an arcventure and one described by Ocean boss David Ward as ''A new break-through in computer games'', now when did I hear that last?

There will be some new games under the Imagine title too. They will be conversions of two Konami arcade titles and a couple of new sports simulations.

The final releases, from this giant of the software scene, are in their new IQ range which covers the **White Lightning** and other products from Oasis. David claims that they will complete the range of utilities by Christmas including a word processor, spreadsheet and database.

ANSWER BACK 500

kosmos

Questions and Answers

Kosmos Software are following up their Answer Back series for the BBC and Electron with a range of subjects under the title **Factfile 500**. Each Factfile 500 pack contains 500 questions and 2000 multiple choice answers and is compatible with all of the games, editing facilities and questions and answers modes of the Answer Back Quiz programs.

Currently the Answer Back series covers general knowledge and sport but Fact File 500 features questions on topics such as natural history, arithmetic, geography, Scotland, football, London, first aid, British history and general science.

Thirteen titles are released this month and Kosmos intend to add many more subjects to the range by the end of the year.

Disc versions of Factfile 500 cost £5.45 and the cassettes are priced at £3.95.

DIY discs

Ariolasoft release **Skyfox** on cassette for C64 after two conversions from the disc version were scrapped. ''They were rejected,'' said the software house, ''as they failed to allow the player access to both the air to air and air to ground scenarios during the same gameplay.''

Other releases out today on disc include **Music Construction Set** — a make your own music program for the C64 (£14.95), **Pinball Construction Set**, a create your own computer pin ball game for the Atari (£14.95) and **Racing Construction Set**, a game where you construct the track you want to race on, (C64 — £14.95).

Also available are **Adventure Construction Set** and **Mail Order Monsters**, featuring mix 'n' match monstrosities customised for combat by your own hand. Both are for the C64 priced £14.95.

Ariolasoft plan to bring out cassette versions of all these games for the C64 at the end of September but say that one or two of the titles may be difficult if not impossible to convert.

Big breaks

CDS Software are bringing out no less than four new conversions of the **Steve Davis** snooker game — and the man himself is waiting for you on level nine of the Commodore versions. Steve will be patiently chalking his cue while you work your way through the intermediate levels and will then demonstrate how to put away breaks of over a hundred.

Steve Davis Snooker for the C64 costs £8.95 (£12.95). The Amstrad disc version retails at £12.95 and the cassette for the C16 costs £7.95.

SOFTWARE

Nightshade

It's always difficult to review a new Ultimate game, people's expectations of them can be so high that it's easy to feel disappointed if the new game is anything less than world-shattering. Not only do Ultimate have to compete with all the other software houses around, they also have their own reputation to contend with. Alien 8 came in for some criticism, not because it was a poor game, but because it only improved marginally upon the format of Knight Lore.

So, what of Nightshade and Filmation II? To be honest, I don't think that Nightshade is as immediately addictive as Knight Lore, but after playing it for a short while, the game does work its way under your skin, and the 'just-one-more-try' syndrome takes hold.

The details given to you for playing the game are, as always, sparse. Nightshade is the name of a village that has been over-run by the forces of darkness. Plagues have swept the village and its inhabitants have been turned into foul monsters. Your task is to rescue the village from the curse laid upon it, but it is entirely up to you to determine how to do this.

Filmation II retains the slightly overhead 3D perspective of Knight Lore and Alien 8, but rather than moving from one fixed screen to another, in Nightshade the streets and buildings of the village scroll past you — almost like a truly 3D version of the town in Dun Darach. This effect is very impressive — there are no thin-line vector graphics here. Fully drawn and detailed buildings scroll smoothly across the screen without a trace of flicker. If your character passes behind a building, then the walls vanish so as not to obscure your view, and the boundaries of the building are marked to allow you to maintain some sense of perspective.

Filmation II is, by the way, in colour. This obviously makes the screen display more attractive, but the accursed attribute problems do crop up quite a lot and make the graphics look a little less tidy than the two-colour displays of KL/A8.

As I mentioned earlier, Nightshade isn't as immediately addictive as KL/A8. This is because there are none of the obstacles which require split-second timing to get through, and which grab your attention from the word go in those two earlier games. In Nightshade I found myself wandering the village streets for quite a while before I even figured out how to kill the monsters that kept chasing me up and down the streets.

The variety of animated monsters in this game is, however, greater than in KL/A8, and they have more freedom of movement in this game too. Some of them are very nicely designed, and they move just a fraction slower than the Sabreman (yes, it's him again). So some strange scenes can occur as you see the Sabreman being chased along the village streets by creatures with outstretched arms and rolling eyes (like something out of a Maurice Sendak cartoon).

Floating around inside some of the buildings are antibodies, and if you collect these you can use them to combat the disease ridden monsters of the village. There are also a number of objects lying around the town that can be collected and (I suspect) used against the major league nasties responsible for these demonic goings on.

The status display at the bottom of the screen contains a number of figures which, I think, represent the Monsters In Charge that you must defeat in order to save the village. Then again, I could be totally wrong. Ultimate don't give anything away in the game's instructions, and I've just been stumbling along trying to figure out what's happening without getting myself killed.

It will probably take a while to uncover the depths of this game (assuming there are any), and only time will tell if it's as everlastingly addictive as Knight Lore, but even if Nightshade isn't Ultimate's greatest game, it's still streets ahead of most of the competition.   **C.J.**

Price: £9.95

Publisher: Ultimate Play The Game

Address: The Green, Ashby de la Zouch, Leics.

SPECTRUM

Red Arrows

I'm always suspicious when games are released for a wide range of machines — all at the same time. According to the packaging, "it's the most exciting, full colour flight simulation ever written . . ." I totally disagree.

You take to the cockpit of a Hawk plane as part of the famous Red Arrows display team. You must play your role as plane nine by keeping information as the team loops and zooms around. The screen display is a familiar half split, with the instrument panel at the bottom and the window view above. The detailed manual shows which formation patterns to follow — although not what the control keys are.

So, what is my criticism? The program does not in any way feel like flying a Hawk. Graphics are simple, and move mostly by character spaces. There is no sense of speed or the "utmost realism" mentioned in the blurb; for example, to indicate movement when the player flies perpendicular to the ground, the screen flickers while the graphics remain stationary. Sometimes, without apparent reason, the middle of the ill-defined plane in front of you will disappear, although this strangely does not affect its performance! And why is flying suddenly so quiet?

The ground and sky are totally featureless — not a cloud or building in sight. This game is generally pretty featureless too. It might have been good two years ago, but now would only be an adequate budget game. It's vastly over-priced and slightly amateur. **P.S.**

Price: £8.95

Publisher: Database Software

Address: Europa Hse, 68 Chester Rd, Hazel Grove, Stockport.

Music Master

Life's like that, you think you've got the best bit of software around for your particular purposes and suddenly another product appears which changes your ideas.

Until I received this program, I thought that my Activision music package was all I would ever need. How wrong I was. Interestingly enough, this program fills and enhances the gaps left by the other products, it is not for the serious composer intent on creating an accurate score and nothing more.

Instead, Music Master converts your C64 into a synthesiser with a powerful three voice sequencer. Rather than entering music in accurate note values, a real time element is provided allowing a certain amount of feeling to be put into the music.

The program has two main models, immediate playing mode and the sequencer. In immediate mode you can use the C64 as a keyboard and simply mess about. All operations are controlled via menu screens and two help screens enable you to get about. In immediate mode, you can play any of the three voices in any combination. The voices, which are active, are played in unison monophonically. This is the only really poor feature of the system. A simple polyphonic option would have been handy.

Each voice has its own menu enabling you to alter all features of the waveform, frequency,

Price: £17.95 (cassette)
£19.95 (disc)

Publisher: Supersoft

Address: Winchester Hse, Canning Rd, Wealdstone, Harrow, Middx HA3 7SJ

filtering etc. Special effects are sorted via an effects menu and a filter menu. The special effects menu allows you to set up cross modulation and synchronisation between voices giving some really bizarre sounds. If you invent a really amazing sound which you must use again, there is the option of creating pre-set sounds which can be saved on tape or disc. If you want to impress your friends, there are 17 pre-set rhythms over which you can play your own tune... eat your heart out Phil Collins.

If you want to create and replay music, the sequencer is the way to do it. This section lets you compile three part masterpieces — and really amaze your friends. A word-processor type approach is adopted enabling you to enter and edit music. Sections can be repeated making life fun. The music is stored in terms of beats rather than accurate notes. This means that you can use slightly lengthened or shortened notes to give expression. The score can be saved for future use.

The disc was bursting with demonstration pieces, some to a very high standard. One huge piece called "Sing-along-a-64" reminded me of the days when I used to play gigs at the local British Legion — quite tear jerking really. The instruction booklet is detailed and has a number of examples to enable you to get to grips with the package.

This is a first class package which operates faultlessly and is tremendous fun to use. At the price, it offers a genuine budget alternative to the more expensive MIDI based systems. **A.W.**

★ ★ ★ ★ ★
Flipped

★ ★ ★ ★
Hooked

★ ★ ★
Keen
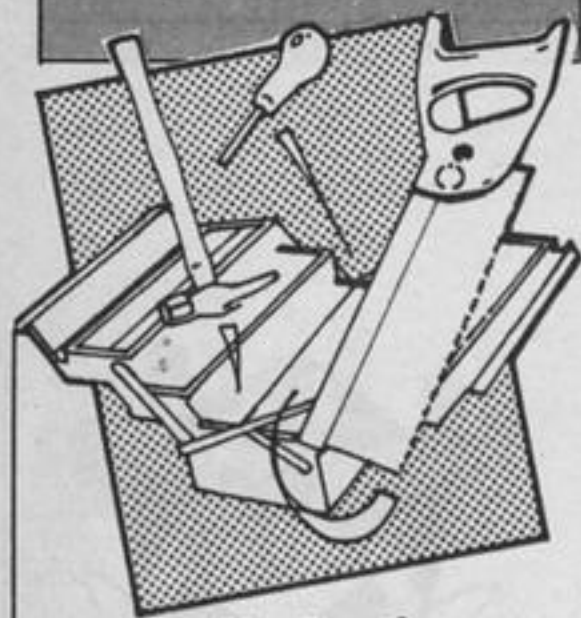

★ ★
Yawning

★
Comatose

Fig Forth

There comes a time in every programmers life when he begins to wonder what lies beyond Basic. Some people look to Assembly language for their next challenge whereas others may decide to test their skills on a second high level language. With the release of Fig Forth from Amsoft, Amstrad users now have the opportunity to take the second option.

Forth is a good language to choose as your second language as it combines many of the features of a high level language with the speed of machine code.

One of the nice things about Forth is its flexibility, it is a kind of do-it-yourself language. The Amsoft version of Fig Forth consists of a nucleus dictionary of approximately 240 words. Each of these words will perform a specific task, the idea behind Forth is that the user combines specific sequences of these words to perform a task. Having created several of these new words they too can be combined to give a further word which carries out the complete sequence of tasks.

Forth words can be defined directly from the keyboard in command mode or via a screen editor. The screen editor allows the user to enter his definitions as up to 11 screens of source code. These are then stored in what they call a RAM disc, individual screen can be listed and edited until the program functions as expected.

The documentation supplied is essentially a reference guide but does contain a short section for beginners. The Amsoft version of Fig Forth is a very comprehensive implementation of the Forth language.   **J.R.**

Price: £24.95

Publisher: Amsoft (Abersoft)

Address: Brentwood Hse, 169 Kings Rd, Brentwood, Essex CM14 4EF

Use It

You don't often come across a real time clock, a calculator and graph-producing package integrated together for the Amstrad, well not every day at least. Use It is just this and offers fully controllable features for all three of its parts. Taking a full eight minutes to load, the program features some very nice icon-like graphics. Icon-like in that they look rather the same but unfortunately are not used for inputting information but just to enhance the screen display.

The clock offers a choice of digital or analogue faces, stopwatch, countdown, and alarm facilities but, unfortunately, the real time element does not stretch to a constant real-time display making this program of little practical use.

The calculator is pretty but not that functional. Even with binary and hexadecimal calculation facilities, the lack of convenience is regrettable.

The graph package is better than the other two and more useful. Up to 20 different values (I would have liked 24 as a minimum for biannual figures) can be displayed as pie charts, line graphs or bar charts, and there are comprehensive editing features. As with most graph packages though, without the ability to dump the contents to a printer the package loses most of its value.

If the package could have been run concurrently while another program (say a word-processor) was in operation — rather like the IBM program, Sidekick — then it would be of great value and I would have recommended it. As it does not, I see little use for it and can only think of it as a novelty over-priced at £6.95.   **C.G.**

Price: £6.95

Publisher: Bubble Bus Software

Address: 87 High St, Tonbridge, Kent TN9 1RX

Castle Assault

Castle Assault at best can be described as a platform game where you must gain access to four floors using ladders.

There are many obstacles to make your journey difficult, monstrous crabs guard the floors which you have to jump to avoid. Your timing here has to be good because the crabs are also jumping up and down.

On reaching the top floor and collecting the gold you go to the next screen where crabs turn to snakes and birds appear on each floor ready to peck you to death. As if this was not enough, you have to avoid falling boulders while trying to climb up the levels.

This is a very entertaining game. The control keys are well located which makes them easy to use. One thing I liked about it is the absence of colour clash, which means your man does not change colour when he is on a coloured background. I do feel the sound quality could have been better, but what is there is quite adequate.

One feature about this game which annoyed me was that you have to climb the ladder right to the top before you can jump off which slows the game down somewhat.

I am surprised that this quality game is being marketed at such a low price. Maybe this reflects the state of the industry. If you have a quest for gold then this game will fulfill it!   **M.B.**

Price: £2.50

Publisher: Blue Ribbon Software

Address: Silver St, Doncaster, South Yorkshire.

Nightmare Maze

Ever had a nightmare where evil monsters are chasing you, you just cannot get away from them, and the only safety is waking up? Well, Nightmare Maze has brought it to life.

You are Sleepy Joe, who must collect 10 keys from a maze while avoiding the monsters. Because of its colour scheme the maze appears to be in three dimensions. Moving around adds to the difficulty of the game. To execute a smooth sideways move you must align your man exactly with the part of the maze through which you want to pass. This is not very easy when you have a springy monster hard on your heels.

The task of collecting keys is not easy either as they appear only one at a time. Every so often a cup of coffee appears in the maze; if you drink this it will wake you up and the monsters will disappear for a while. This gives you extra time to collect the keys.

The only thing which annoyed me was that if you lose a life you also lose all the keys and you have to start all over again. If you manage to collect all the keys then the door of the maze will open and you can escape only to find yourself in an even harder maze with a new set of monsters.

The graphics are good and although this game is a clone of an old classic, it is excellent value for money. This game takes over where nightmares end.   **M.B.**
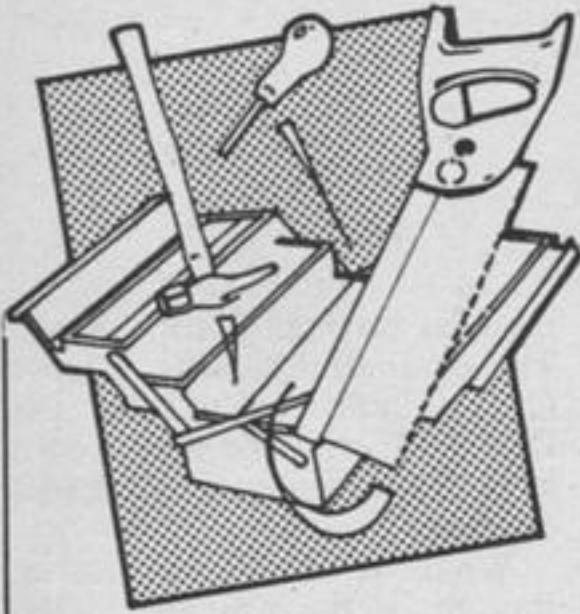
Price: £2.50

Publisher: Blue Ribbon Software

Address: Silver Hse, Silver St, Doncaster, South York.

AMSTRAD   AMSTRAD   ELECTRON   ELECTRON

Music Maker

Just recently, the music scene for the Beeb has been hotting up with the release of numerous books, a couple of keyboards, synthesizers and lots of firmware and software. What makes this latest offering from Fsoft special is its price. It costs only £9.00.

The package consists of two sections: the sound and the player. The sound is basically an envelope designer in which the amplitude and the pitch are represented graphically. The parameters may be changed and the effects heard immediately. You can store 16 envelopes in memory at once which may be played on the keyboard. The sound is very easy to use and is as good as any other similar program on the market.

The player is a rather sophisticated sequencer. The BBC keyboard behaves as the music keyboard and up to three notes may be played at once. By selecting record mode, you can store away a tune in real time and the notes are printed on a scrolling stave at the top part of the screen.

A metronome may be simulated for timing but if you do make a mistake, you can edit the program using a simple line editor. Having to use the Beeb's keyboard to play the music, mistakes are bound to be made and unfortunately, the editor is fiddly and time consuming.
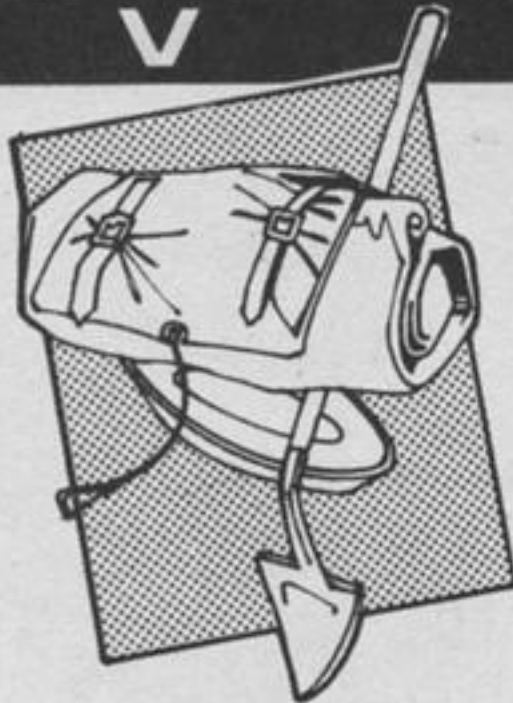
Overall, the package is easy to use and represents remarkable value for money. If only editing could be done graphically (like the rival music system by Island Logic) as well as in real time, then this package would be unbeatable. **S.S.**

Price: £9.00

Publisher: Fsoft

Address: PO Box 352, Brighton BN1 3AY

BBC

Quann Tulla

Eighth Day Software have got themselves a good reputation for their budget-proced, well thought out Quilled text adventures. Their secret, apart from price, is an interesting scenario packed with interesting puzzles and commands. Quann Tulla is in a similar vein to their previous offerings.

Trapped on a wrecked spacecraft you must leave the ship and then travel the galaxy fighting the evil Empire for the sake of the Federation, (no trace of Star Wars there?) The adventure starts rather differently with you in dire trouble. You're in a damaged air bubble fighting for breath and only have a few moves before you suffocate. The solution is fairly simple but the game has already started your pulses racing. You have solved a puzzle, your mind starts to become tuned to the adventure and you appreciate the danger involved.

The adventure mechanism is obviously only as good as the Quill — which is good but fairly basic. Only two word combinations are allowed and the screen display is fairly limited. The actual adventure content is very good and pretty addictive as adventures go. There were several grammatical and spelling mistakes, but in an adventure so full of text, that can be forgiven.

I liked the use of the second side of the tape to give the storyline of the adventure, hints on how to play the adventure and details of Eighth Day's other adventure games. The adventure was challenging without being too hard — let's say it's an intermediate's game — and at the given price it represents extremely good value. **C.G.**

Price: £2.50

Publisher: Eighth Day Software

Address: 18 Flaxhill, Moreton, Wirral, L46 7UH

AMSTRAD
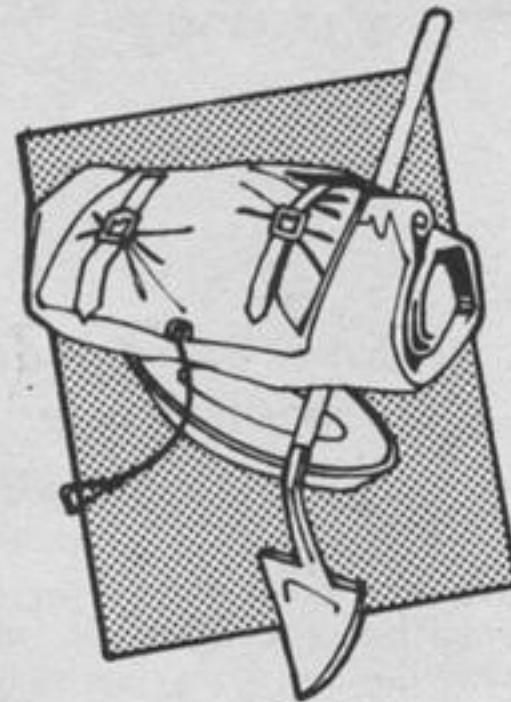
Crystal Quest

To date this has got to be the cheapest piece of software I've seen. At 99p it really does live up to its name of Pocket Money Software. The game is a text only adventure and although no message is given to confirm my suspicion, its layout and feel suggests that it was created using the Quill.

The scenario isn't amazingly novel but is sufficiently different to be attractive. You are tasked with searching for three crystals which can be used by scientists to create a serum to combat a plague which is devastating the earth. You start in a space ship clearly indicating a degree of interstellar travel.

The author gives little away with the scenario being short on clues and quite generous on problems. This, unfortunately, is aggravated by some inconsistences in programming. The operation PUSH BUTTON, for example, works in one location but results in a response on non-comprehension in another area. Another fatal, and not un-common, flaw is that objects are described in room descriptions but cannot be taken or used. This, of course, is due to poor attention to detail.

The atmosphere generated is good with quite detailed descriptions and a futuristic character font. The usual verb-noun format is used for commands and, sadly, the responses often not that helpful. Despite my reservations, this is a tricky and entertaining game which, at the price, is excellent value. Try it, even if you don't like it the money you lose is hardly bank-breaking. **A.W.**

Price: £99p

Publisher: Central Solutions

Address: 500 Chesham Hse, 150 Regent St, London, W1R 5FA

SPECTRUM

Cops 'n' Robbers

This game has a slightly amateurish look to it — it loads rather slowly and the graphics are not very sophisticated. The main character moves quite well horizontally, but appears to be lying down when you move him vertically, which looks very odd! However, that didn't prevent me from enjoying the game: in fact, it is more fun to play than many swisher and more expensive productions.

You are cast as a robber, Light Fingers Lonegan, who is after the gems in the Acme Diamond Company building. The cops are hot on your heels, but fortunately they are not very intelligent and you should be able to avoid them unless you are unlucky enough to bump into one as you emerge from a lift.

There are a few objects to collect and puzzles to solve, to help you to reach all the diamonds: for example, you have to find the combination to the safe and the key to the roof. You also have to take the diamonds back to your escape car, a slightly hazardous procedure as the police are thicker on the ground outside the building than they are within it.

The levels of difficulty determine the speed at which the game runs. F1 selects the hardest level, F7 the easiest; its a shame the programmer didn't include a few more lines of code to reverse these into a more logical order. But despite such minor quibbles, this is as good a graphic adventure as you could expect to find at this price level. **M.N.**

Price: £2.99

Publisher: Atlantis Gold

Address: 19 Prebend Street, London N1 8PF

C64

FIRMWARE

Dave Reader delved into Watford Electronics new DDFS and filed this glowing report

Like many other Beeb owners I took the opportunity of the recent Acorn User Show to upgrade my system and move onto discs. Prices of drives have tumbled dramatically during the last year and the dearth of new BBC games on cassette coupled with the increasing sophistication of the user base meant the time was right.

That far it was easy. The real fun with upgrading to discs comes when you have to make a decision about the Disc Filing System. Problems with Acorn's own DFS are quite well-known by now — as it uses the 8271 floppy disc controller it has become hard to get and increasingly costly as supplies of the 8271 chip have dried up. Other companies rushed in to offer alternative DFS support; Watford Electronics being one of the first.

Of course, the further you get from the Acorn "standard" the more problems may arise with compatibility. Yet the inadequacy of the Acorn DFS (single density only, a maximum of 31 files per catalogue and a shortage of possible utilities) was even recognised by Acorn whose DFS in the new BBCÜ (the 1770) adds utilities such as formatter, a verifier and a file closer into ROM.

So why the need for Double Density? Apart from the cheapness and availability, the main advantage is the additional disc space — not twice the information per disc as you might expect, but about 60%-80% more. Watford have built here on their good alternative to the Acorn DFS and their DDFS is based on the 1770 chip.

Fitting is reasonably straightforward. The package comes with four chips, a double density board, installation details and a 112 page manual (in fact, the Watford DFS manual with a four page addendum covering the DDFS). On issue 4 boards and above it should just be a matter of replacing chips and checking that a link is cut; issue 1-3 boards require rather more work but shouldn't be beyond the capabilities of a reasonably competent person.

However, if you've no experience of fitting chips or roms, if you don't feel too confident then you're probably best going to a dealer for the fitting.

I thought it would be easy enough. Sadly the fitting instructions are, to say the least, a little scimpy and I ran into a problem. For some reason my issue four board had a strange connecting wire that hung up the DDFS. The show was still on so I rushed back to get some advice from Watford — they were unable to help but luckily the good folk at Solidisk Technology were doing repairs on their stand. Despite giving me some light-hearted stick about not having the excellent Solidisk DFS, Marc Batter soon had the DDFS up and running.

The DDFS is remarkably like the standard Watford DFS. It offers an option of single or double density as well as 31 or 62 files, selectable in formatting. It defaults to single density on a hard reset, allowing faster booting of the Z80 second procesor and other software.

It is highly compatible for all other 31 file systems) but offers these extras:

New star commands: *HELP SPACE and *HELP FILES returns the amount of free space on a disc (80 track double density offers up to 359.5K instead of a usual 256K) and information on any open files. *MOVE is a *COPY like option which now demands confirmation before action. *MLOAD and *MRUN allow relocation of machine code to defined load addresses. *WORK is a useful tool for programmers as it allows a workfile name, so programs with different version numbers can be saved. *TIDY closes any open files on disc rather like the new Acorn DFS' *CLOSE. *EDIT takes you into a disc sector editor which sadly is hard to read on a TV (80 columns in Mode 0).

Finally, 40 track discs can be read and written to on 80 track drives and an OSARGS call inserted to avoid clashes with hardware such as the Aries board.

General improvements are also much in evidence. Advances in single density have been noted and the drive is now retained through a soft Break. The compatibility with Econet is also improved so that the DDFS will run the new Acorn level 2 file server and teletext systems.

What is most impressive, though, is the way the DDFS avoids most compatibility problems through a very extensive 8271 software emulator. Nearly all major software runs with this (notable exceptions being The Hobbit and Disc Doctor) and, ironically, because of the current vogue for software protection that relies on oddities in the 8271 it will probably be more compatible than the new Acorn 1770 DFS — this protection is used in some Acornsoft products too.

To sum up, this is a very good standard DDFS. There is nothing about it that demands your unqualified support but loss of exciting extras does mean it has no obvious faults. Quicker than the Watford DFS, it offers a range of options and commands that make life reasonably easy for the disc user (even the first timer like me).

As so often in the computer field, your final decision will probably depend on how you work out the equation of extra commands and features against less standardisation.

Roughly similar to the Viglen DDFS it has a competitive price and really has only one area that could be improved. The manual is poor and the fitting documentation inadequate. Watford also sell for £6.95 a very useful book (Mysteries of Disc Drives & DFS Revealed) which they suggest as ideal for someone contemplating purchasing a disc system. It is clear, well written and should be included in the Watford DFS and DDFS kits — to take one area alone, you could save its cost in terms of frustration if you use the book's DFS fitting instructions!

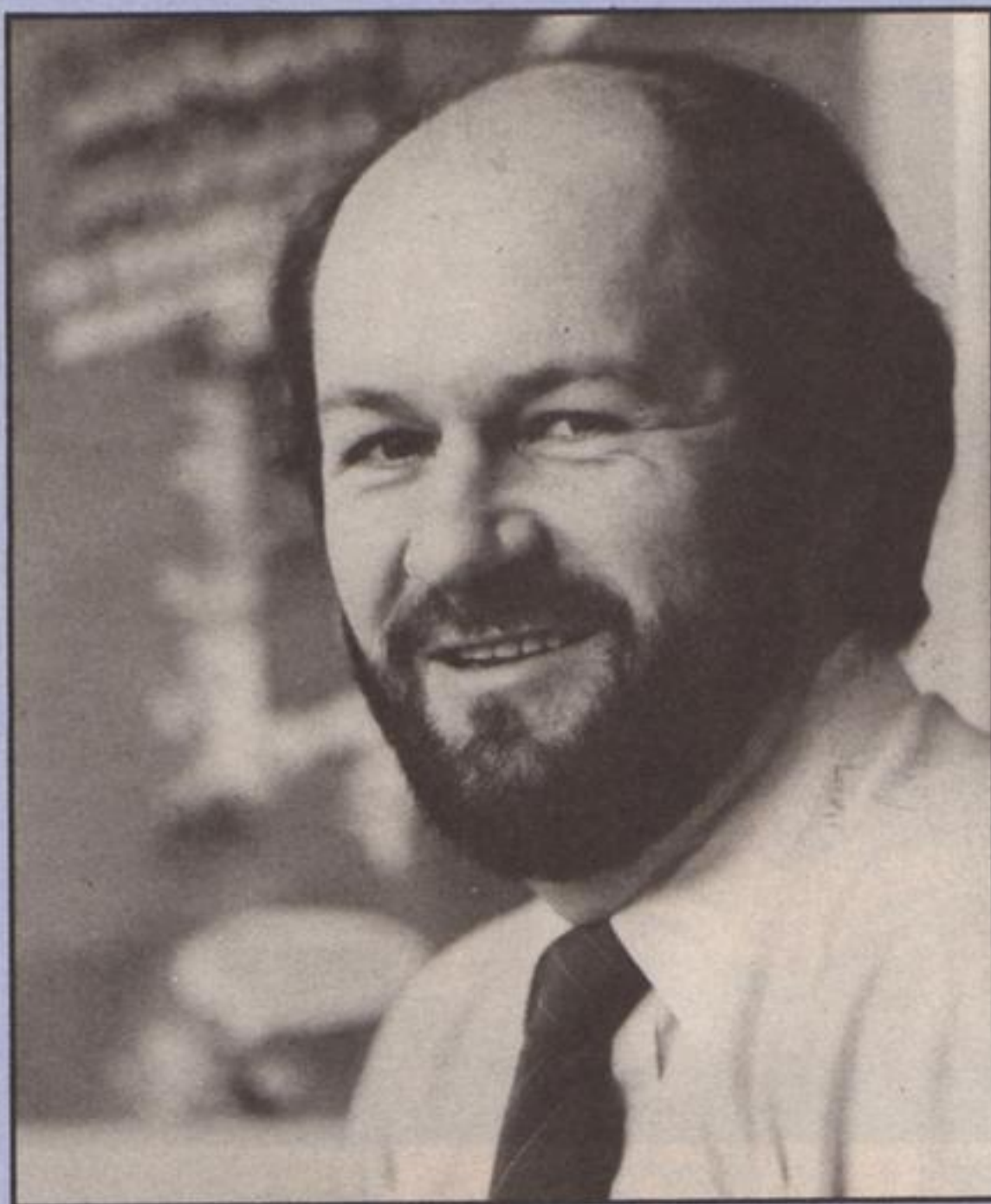**Price:** £79 (plus £6.95 for DDFS Manual) Upgrade from DFS £40

Supplier: Watford Electronics

Address: 250 High Street, Watford WD1 2AN

BBC

TIME CAPSULE

This week it's the turn of Creative Sparks to provide our Time Capsule subject and their Sandy Mackenzie fits the bill nicely

It looks like we are going to have to increase the size of our time capsules if this selection from Sandy Mackenzie is anything to go by. He wants to include eight software packages and all the usual hardware, but more of this later.

Sandy is the Publishing Manager for Home Products at Thorn EMI, the owners of software house Creative Sparks and publishers of Sparklers, a range of budget games which is being extended on a week by week basis it seems at the moment! Sandy has been with Thorn EMI for a number of years now, having started with the video and audio area he soon moved on to software when the company were ready to start producing games for the Atari machines.

They were producing games for the Game Console and for the 400 and 800 models for about two years until the parent company decided that they were going to stop investment in that area. It was due to this decision that Sandy slid into the area of home computers and started to get to know the Home Computer scene more intimately. He was soon fully involved with the whole range of activities from the purchasing of titles to program development and then marketing.

I quizzed Sandy about the early days of Thorn EMI's involvement and he explained that there was a time when 40 programmers were employed at this side of the Atlantic producing games concepts and ideas for customers in the USA. These were sold as cartridges for the Atari machines and were very successful for a time until, as he put it, "the bubble burst".

This led to the formation of a business computer software division in the States and the UK side of the business started to move towards this area too.

"During last autumn we started to move all our software development out of house and that is the situation that we still maintain today. The Creative Sparks titles are all commissioned from third party programming teams and the Sparklers range are all submitted programs, some from smaller houses and others from individuals."

Sandy has two computers at home, a Spectrum and a C64. "I have to fight my two boys for the time to use them", he claims, but it is no surprise therefore that his first choice for the capsule is the Spectrum.

"The Spectrum really opened up the market here in the UK and vastly increased the number of computer owning homes. The real breakthrough was the memory on board and the price. We now know that there are serious drawbacks to the product, its nasty little keyboard, the colour attribute difficulties and the terrible sound, but at the time of its release none of these were apparent."

He wanted to include another computer in the hardware section and it is no surprise to find that he names the machines that made Thorn EMI's software division a force to be noticed. "The Atari was always an interesting machine, far ahead of its time. As far as I'm concerned it is still far superior to the C64. It was simply a matter of marketing expertise — Commodore got it right and Atari got it wrong!"

From the hardware, our attention turned to software and it was here that the need for an elastic sided time capsule became apparent. "Nearly all
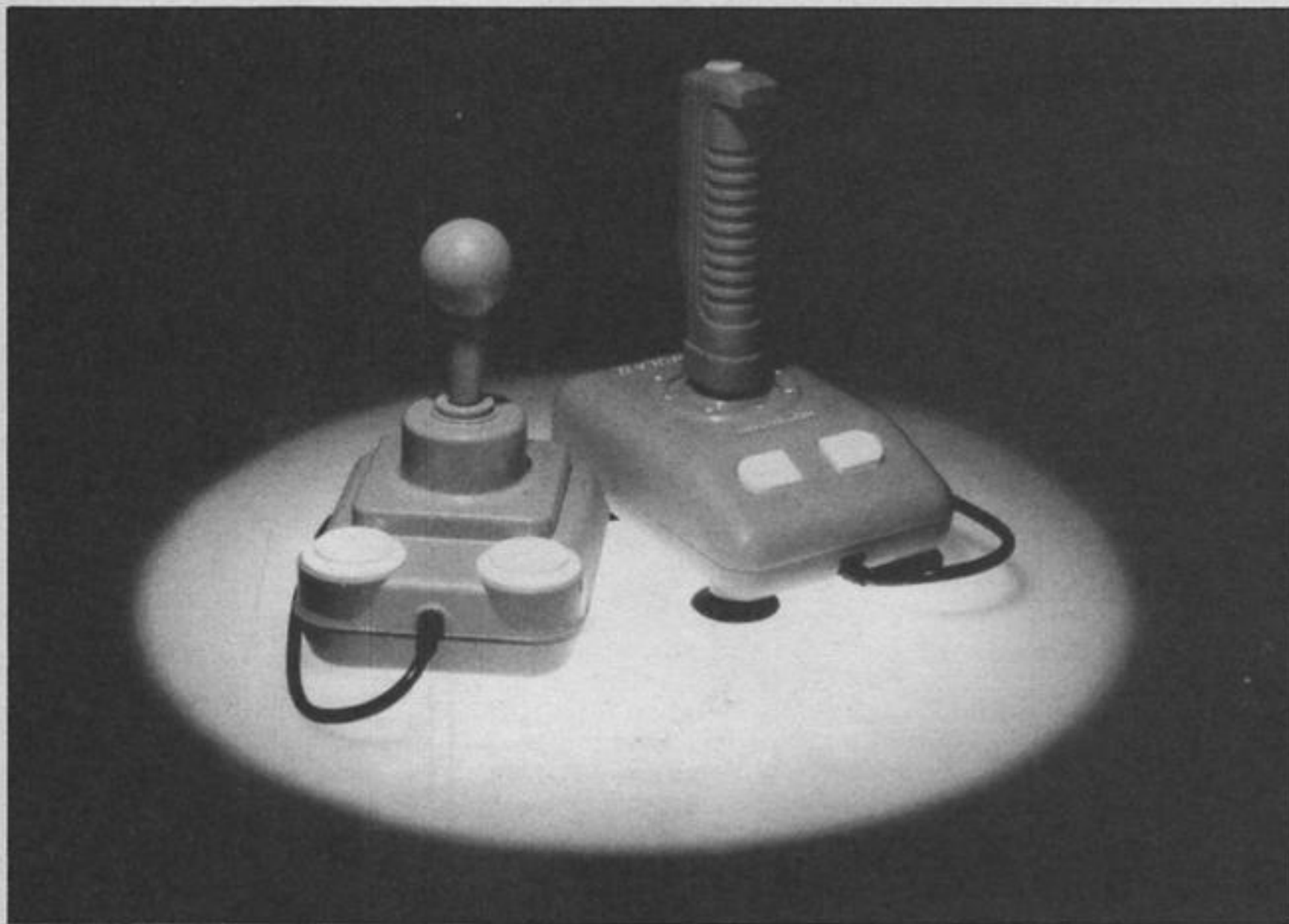
Kempston's Formula I and II joysticks

the software that I value particularly is American and I have no apologies for that. The first is for the IBM machine but can be described as home software as that is where it is used most. Microsoft/Sublogic's Flight Simulator is THE program for me. Every businessman has a copy and it really is just like the real thing."

"Infocom's adventures are superb, especially Zork I and II. They would have to be included in any selection. From the sublime we go to the earliest of games, Pong. No one really knows who developed the game but it is credited to Norman Bushnell the founder of Atari."

The next software to be stuffed into the capsule came from Japan. "I cannot leave out Pacman. As far as this industry is concerned the Japanese ruled the world for a period of two or three years with this game." The first platform game also deserves a place according to Sandy. "This game was before Jet Set Willy too, Miner 2049er was the first of a whole new genre."

Frantically trying to find more space for all these programs we thank our lucky stars that it is soft and not hardware, at least you can squash soft items a little! Sandy, completely unpeturbed, is still selecting his games. "The first software toy should be included. The Pinball Construction Set was just that and great fun it is."

"As far as multi-player

games go there has to be space for Mule from Electronic Arts. This is the nearest game to the traditional board game and has all the elements that makes such games addictive. It is all about people really and involves trading, bargaining, exploration and empire building."

"My final selection is one of our own products and I have no qualms about selecting Macbeth. As far as I'm concerned it is one of the best packages ever put together for a home computer. The depth of research involved was vital to its success and it really showed in the game." Whilst Sandy took a breath and a drink of coffee, I managed to close the lid on the software selection and we agreed to look at peripherals.

"The peripheral that has meant most to the most users has to be the joystick. There are so many to choose from that selection is difficult but I would include the Kempston micro switch sticks like the current Formula 1."

"After that life is more difficult. I would also include the Koala Pad as a simple to use creative aid. It really gets kids going and is one way that the computer can be used to enhance creativity. As with all products of this type the software is vital and this part of the package is very easy for children to relate to."

Sandy admitted that he had no clear view on books as he hadn't read that many. "The best for beginners has to be

Illustrated BASIC with all its cartoons. Apart from that the Rodney Zak's books are the only other noteworthy titles that I am familiar with." It looks as though we are going to have to make some kind of award to the authors of these books, they seem to have been mentioned in every Time Capsule interview that we have done!

Having packed and sealed the Time Capsule for another week we then turned to crystal ball gazing and speculation as to what the future holds for this industry. Sandy admitted that

he found the ball quite murky at the moment, "I cannot believe that there will ever again be a single machine as successful as the Spectrum. Amstrad have a good product with their one plug computer and the Apricot F1 is a good business machine which is coming down to a price which may attract the home user."

"What we really need is some type of standardisation and then a real price/performance calculation can be made. I have to admit that our programmers are getting very excited about the Commodore Amiga and the Atari St but we will have to see."

"The icon system used on the Macintosh is a step in the right direction but I have the feeling that it is just a step on the path to somewhere else. Games won't go away, they will get better and more sophisticated but I can't see them becoming a mass market like records. The computer in the home is still a solution looking for a problem, the man in the street just doesn't know what to do with one."

"The area that is not being allowed to take off is communications. It can be used to make contact and send letters. Electronic mail is vital for the home but is just too expensive at the moment because it is meant to appeal to the business user. Perhaps when it becomes cheaper this whole area will open up tremendously."

VIC-20 GAME

MUTANT MANIA

There's bugs galore, of the mutant kind, in this BASIC and machine code game for the VIC-20 un-expanded from S Mitchell

There's a planet awaiting your every move in this game. Fred, your alter ego, is in a rather tight spot on a planet full of six-legged creatures.

His only means of defence are the lightning bolts that use up his energy at an alarming rate of volts. In all it's a tough existence and he has to settle for the maximum number of kills for the energy that he starts with.

The game will work on both keyboard and joystick input so get our your rubber boots and get zapping.

Variables

SC score
HS high score
T general counter
X position of main character
A value of current data item
E energy remaining
Z position of mutant
K random colour
G game over flag
S position of lightning bolt
AS detects keyboard press

How it works

1-7 initialisation
8-18 graphics
19-24 machine code horizontal scroll
25-36 set up screen and move characters
37-44 release and move lightning bolt
45-52 move main character
53-66 game over screen
67-88 press shift-key subroutine

```
0 REM MUTANT ATTACK
1 PRINT"██":POKE36879,8
2 POKE36878,15:POKE36877,0:POKE36876,0:POKE36875,0:POKE36874,0:POKE36869,240
3 SC=0:HS=0
4 POKE56,27:POKE55,255:POKE52,27:POKE51,255
5 GOSUB67
6 PRINT"█PLEASE WAIT........"
7 FORT=7168TO7679:POKET,PEEK(T+25600):NEXT
8 X=7168
9 READA:IFA=-1THEN19
10 POKEX,A:X=X+1:GOTO9
11 DATA223,223,223,0,251,251,251,0
12 DATA2,25,37,2,2,37,25,2,64,156,182,85,85,182,156,64
13 DATA63,110,252,240,240,252,126,63
14 DATA56,108,254,255,248,254,124,56
15 DATA252,118,63,15,15,63,126,252
16 DATA28,54,127,255,15,255,62,28
17 DATA0,0,31,16,8,252,0,0
18 DATA-1
19 X=829
20 READA:IFA=-1THEN25
21 POKEX,A:X=X+1:GOTO20
22 DATA169,19,32,210,255,169,29,32,210,255,169,13,32,210,255,169,0,141,60,3
23 DATA169,29,32,210,255,169,20,32,210,255,169,13,32,210,255,238,60,3,173,60,3,2
01,21
24 DATA208,231,96,-1
25 POKE36869,255:E=100
26 PRINT"█"
27 X=7630+(10*22)
28 POKEX,3:POKE36876,240:POKEX+30720,1
29 PRINT"█                    ":PRINT"█"SC,E
30 Z=22*(INT(RND(1)*21)+1):IFPEEK(7700+Z)<>320RPEEK(7701+Z)<>32THEN30
31 POKE7700+Z,1:POKE7701+Z,2
32 K=RND(1)*6+2
33 POKE38420+Z,K:POKE38421+Z,K
34 E=E-2:IFE<=0THEN53
35 G=0:GOSUB44:IFG=1THENPOKE36869,240:PRINT"█":GOTO53
36 POKEX,4:POKEX+30720,1:POKE36876,235:GOSUB44:SYS829:GOTO28
37 S=X+1
38 POKE36874,240
39 E=E-10
40 IFPEEK(S+1)<>32THENPOKES+1,32:POKES+2,32:SC=SC+10:E=E+60:POKE36874,0:RETURN
41 S=S+1:POKES,7:POKES,32
42 IFS>X+3THENPOKE36874,0:RETURN
43 GOTO41
44 REM
45 IF((PEEK(37137))AND4)=0THENX=X-22
46 IF((PEEK(37137))AND8)=0THENX=X+22
47 IF((PEEK(37137))AND32)=0THENGOSUB37:RETURN
48 IFX<7702THENX=7702
49 IFX>8142THENX=8142
50 IFPEEK(X+1)<>32THENG=1
51 POKE36874,0
52 RETURN
53 REM
54 POKE36878,15
55 POKE36869,240
56 PRINT"█"
57 POKE36876,0
58 PRINT"█████G█MME.............█████R"
59 FORT=1TO3:FORZ=250TO110STEP-5:POKE36876,Z:NEXT:NEXT
60 PRINT"██SCORE:"SC
61 IFSC>HSTHENHS=SC
62 PRINT"██HIGH SCORE:"HS
63 SC=0
64 PRINT"███PRESS ANY KEY TO PLAY."
65 GETA$:IFA$=""ANDPEEK(653)=0THEN65
```

```
66 GOTO25
67 REM
68 PRINT"   MUTANT ATTACK BY SGM  ----------------------"
69 PRINT"FRED IS HAVING A SPOT OF BAD LUCK.HE'S BEEN"
70 PRINT"MAROONED ON A PLANET  POPULATED BY GIANT    MUTANT INSECTS."
71 PRINT
72 PRINT"LUCKILY,THE CREATURES ARE EDIBLE;BUT TO    CATCH ONE,FRED MUST "
73 PRINT"GET CLOSE ENOUGH TO    KILL IT WITH HIS     DEADLY LIGHTNING BOLTS";
74 PRINT"WITHOUT GETTING KILLEDHIMSELF."
75 GOSUB89
76 PRINT"  ";
77 PRINT"FIRING A LIGHTNING     BOLT WASTES 10 UNITS  OF FRED'S ENERGY.EXTRA";
78 PRINT"ENERGY IS OBTAINED FOREACH MUTANT KILLED,AND10 POINTS ARE SCORED."
79 PRINT"FRED MUST KILL QUICKLYSINCE HIS ENERGY LEVELFALLS CONSTANTLY."
80 PRINT"THE SCORE IS SHOWN AT THE TOP LEFT OF THE   SCREEN,THE ENERGY"
81 PRINT"REMAINING AT THE TOP  RIGHT.IF FRED RUNS OUTOF ENERGY,HE DIES."
82 GOSUB89:PRINT"  ";
83 PRINT"USE YOUR JOYSTICK TO  MOVE FRED UP OR DOWN."
84 PRINT"PRESSING THE FIRE     BUTTON WILL RELEASE A LIGHTNING BOLT.FIRING"
85 PRINT"CONTINUES AS LONG AS   THE BUTTON IS HELD   DOWN,SO BE CAREFUL NOT";
86 PRINT"TO RUN OUT OF ENERGY. EACH LIGHTNING BOLT  HAS A RANGE OF ABOUT"
87 PRINT"ONE-THIRD THE DISTANCEACROSS THE SCREEN."
88 GOSUB89:RETURN
89 REM
90 PRINT"                        PRESS SHIFT KEY."
91 FORT=1TO300:NEXT
92 PRINT"                        PRESS SHIFT KEY."
93 FORT=1TO300:NEXT
94 IFPEEK(653)=0THEN89
95 RETURN
```

FORTHCOMING ATTRACTIONS-

More game, more graphics, giving more enjoyment than ever before on the Spectrum

MIKRO·Plus

SPECTRUM GAME

RADIO MESSAGE

Andrew Bird had a spare few seconds the other day and our programming "whizz kid" produced yet another super Spectrum game

Radio Message is a combination of arcade and strategy games which will have your fingers in knots and your hair falling out as you try to get your message to the opposite side.

The purpose is to relay a secret coded radio message from the imaginary country MURT to CEPS (Spectrum) (Top to bottom of screen). This must be done by constantly changing the transmitting and receiving bases and bouncing the beam off a patrol ship sailing due east.

Should your beams cross the path of an Attributus vessel then the mission will have been a failure.

Good luck!

How it works

1-50 initialise, variables etc.
100-990 screen display & set up for game
1000-1150 main loop of game
2000-2060 win routine
5000-5090 lost routine
7000-7100 instructions
9000-9030 graphics
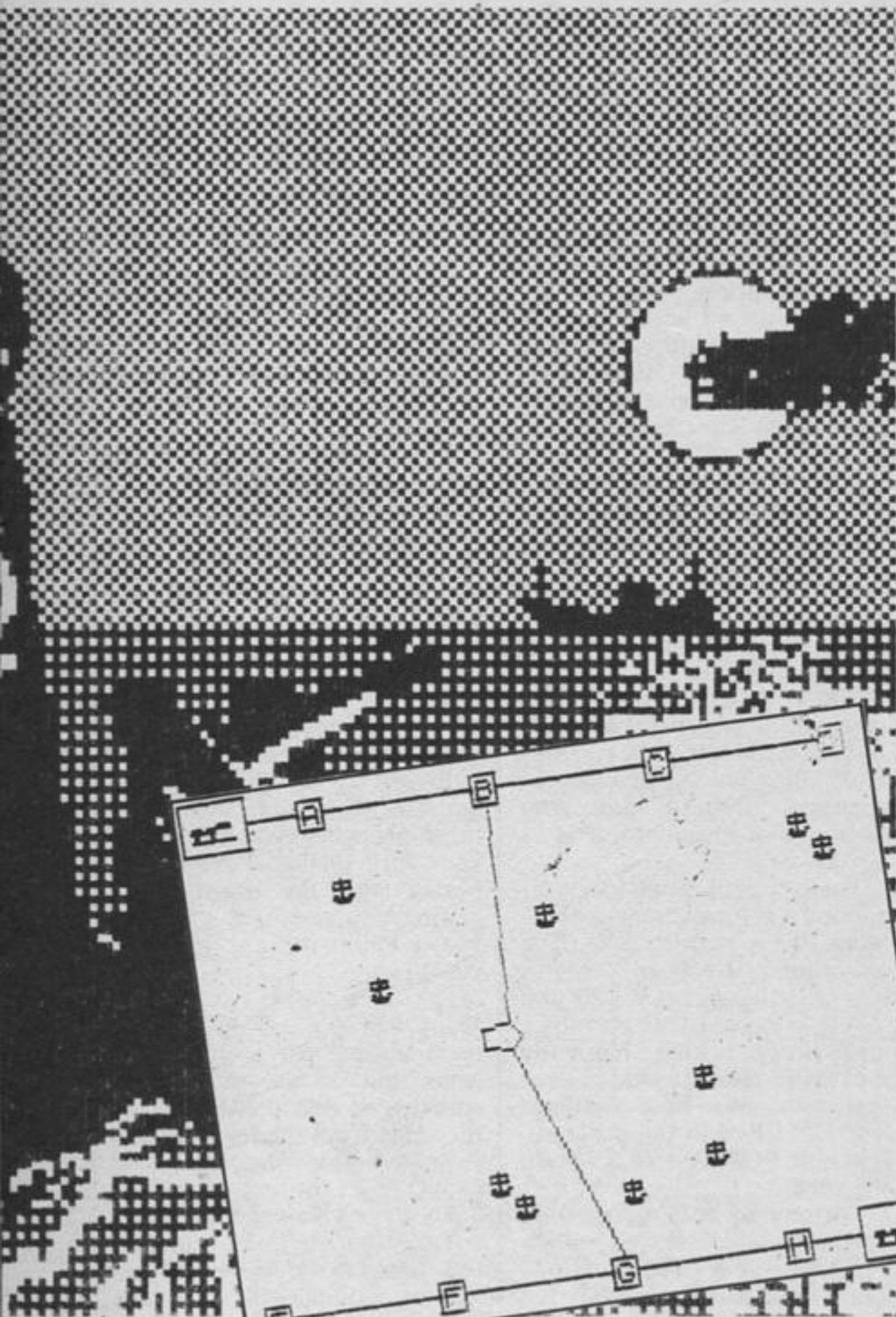**9500-9510** m/code sound

Variables

DIM a	transmitting & receiving bases
DIM b	
DIM x	co-ordinates for ships
DIM y	
DIM m	attribute addresses
c	counts ships
attr	counts attribute addresses
s1	bases in use
s2	
l	main loop
i$	instructions
d	operates m/code
f	general purpose loops
n	

```
  1 REM   Radio  Message
  2 REM   By Andrew Bird
  3 GO SUB 9000: GO SUB 7000
  5 POKE 23658,8: POKE 23609,25
  7 RANDOMIZE
 10 DIM a(4): DIM b(4)
 20 DIM x(10): DIM y(10)
 25 DIM m(10)
 30 FOR f=1 TO 4: LET a(f)=f*8-2: LET b(f)=f
*8-7: NEXT f
 40 FOR f=1 TO 5: LET x(f)=INT (RND*5)+4: LE
T x(f+5)=INT (RND*5)+13: NEXT f
 50 FOR f=1 TO 10: LET y(f)=INT (RND*25)+6:
NEXT f
 99 REM  Screen display
100 BORDER 1: PAPER 1: INK 0: BRIGHT 1: CLS
110 FOR f=0 TO 2: PRINT AT f,0; PAPER 4;"
               ";AT f+19,0;"
               ": NEXT f
130 FOR f=1 TO 4: PRINT AT 1,a(f); PAPER 6;C
HR$ (64+f);AT 20,b(f);CHR$ (68+f): NEXT f
140 FOR f=47 TO 239 STEP 64
150 PLOT f,159: DRAW 0,9: DRAW 9,0: DRAW 0,-
9: DRAW -9,0
160 PLOT f-40,7: DRAW 0,9: DRAW 9,0: DRAW 0,
-9: DRAW -9,0
170 NEXT f
180 FOR f=56 TO 184 STEP 64
190 PLOT f,164: DRAW 54,0: PLOT f-40,12: DRA
W 54,0: NEXT f
200 PLOT 28,164: DRAW 18,0: PLOT 208,12: DRA
W 18,0
```

```
1110 PRINT AT 1,1; PAPER 4;"AB";AT 20,29;"AB"
1120 PLOT  OVER 1;a(s1)*8+4,158: DRAW  OVER 1
;1-a(s1)*8,-65: PLOT  OVER 1;1+4,83: DRAW  OV
ER 1;b(s2)*8-1,-66
1130 PLOT  OVER 1;1+4,92: DRAW  OVER 1;4,-4:
DRAW  OVER 1;-4,-4: DRAW  OVER 1;-10,1: DRAW
 OVER 1;0,6: DRAW  OVER 1;9,1
1150 NEXT 1
1999 REM  Win routine
2000 FOR f=1 TO 10
2010 POKE m(f),73: NEXT f
2020 PRINT AT 7,7; PAPER 6; FLASH 1;" WELL  D
ONE "
2030 PRINT AT 10,7; INK 6;"YOU HAVE ACHIEVED"
;AT 12,7;"YOUR OBJECTIVE"
2040 FOR f=1 TO 250 STEP 3: POKE 32004,252-f:
 LET d=USR 32000: NEXT f
2050 PRINT AT 17,2; INK 5;"PRESS ANY KEY FOR
ANOTHER GO"
2060 GO TO 5090
4999 REM  Lost routine
5000 POKE m(n),249
5010 POKE 32004,250
5020 FOR f=1 TO 50
5030 LET d=USR 32000: BEEP .01,20-f/3: NEXT f
5050 BORDER 2: PAPER 2: BRIGHT 0: CLS
5060 FOR f=5 TO 11: PRINT AT f,5; PAPER 6;"
          ": NEXT f
5070 PRINT AT 6,6; PAPER 6;"OH NO! YOU'VE FAI
LED";AT 8,6;"THE ATTRIBUTY PEOPLE";AT 10,6;"N
OW KNOW EVERYTHING!"
5080 PRINT AT 21,0; INK 7; FLASH 1;" HIT A KE
Y TO BE TRUSTED AGAIN "
5090 FOR d=1 TO 200: NEXT d: PAUSE 0: PAUSE 0
: GO TO 5
6999 REM  Instructions
7000 LET i$=" As chief technical opperator of
 the Murtians your mission is to relay a secre
t coded message    over the radio from MURT t
o CEPSvia a Ceptician patrol ship       sailing
 along the Nyme sea.        "
7010 LET i$=i$+" Thi is done by constantly
  changing the transmitting and . recieving b
ases on either side  of the water.
                      "
7020 LET i$=i$+" However should your beams cr
ossthe path of an Attribtus vesselthen the mi
ssion will have been a failure ........ Good
 Luck"
7030 BORDER 7: PAPER 7: INK 2: BRIGHT 0: CLS
7040 PRINT AT 0,0; PAPER 1; INK 7;" RADIO MES
SAGE   By Andrew Bird "
7050 PRINT : PRINT : PRINT
7070 FOR f=1 TO LEN i$
7080 PRINT i$(f);: IF CODE i$(f)<>32 THEN  LE
T d=USR 32000
7090 NEXT f
7100 PRINT AT 21,9; INK 4;"PRESS ANY KEY": PA
USE 0: RETURN
8999 REM  Graphics
9000 RESTORE 9010: FOR f=USR "a" TO USR "e"+7
: READ a: POKE f,a: NEXT f
9010 DATA 0,0,0,243,255,97,97,255,0,0,62,254,
128,128,128,255
9020 ATA 0,240,255,99,1,1,97,255,0,0,0,240,25
4,134,128,255
9030 DATA 16,254,146,254,16,211,254,124
9499 REM  Sound
9500 RESTORE 9510: FOR f=32000 TO 32023: READ
 a: POKE f,a: NEXT f: RETURN
9510 DATA 1,2,1,33,60,1,17,100,0,229,213,197,
205,181,3,193,209,225,125,145,111,16,242,201
9999 SAVE "RadioRelay" LINE 1
```

```
210 PLOT 4,156: DRAW 0,16: DRAW 24,0: DRAW 0
,-16: DRAW -24,0
220 PLOT 227,4: DRAW 0,16: DRAW 24,0: DRAW 0
,-16: DRAW -24,0
225 PRINT AT 1,1; PAPER 4;"CD";AT 20,29;"CD"
230 FOR f=1 TO 10: PRINT AT x(f),y(f); INK 1
;"E": NEXT f
240 LET c=1: LET attr=22624
250 FOR f=3 TO 18: FOR n=0 TO 31
260 IF ATTR (f,n)=73 THEN  LET m(c)=attr: LE
T c=c+1: POKE attr,77
270 LET attr=attr+1: NEXT n: NEXT f
980 INK 9: POKE 23560,0
990 LET s1=1: LET s2=1
999 REM  Main loop
1000 FOR 1=8 TO 244
1010 PLOT 1+4,92: DRAW 4,-4: DRAW -4,-4: DRAW
 -10,1: DRAW 0,6: DRAW 9,1
1020 PRINT AT 1,1; PAPER 4;"CD";AT 20,29;"CD"
1030 IF PEEK 23560<65 OR PEEK 23560>68 THEN
GO TO 1050
1040 LET s1=PEEK 23560-64
1050 IF PEEK 23560<69 OR PEEK 23560>72 THEN
GO TO 1070
1060 LET s2=PEEK 23560-68
1070 PLOT a(s1)*8+4,158: DRAW 1-a(s1)*8,-65:
PLOT 1+4,83: DRAW b(s2)*8-1,-66
1080 FOR n=1 TO 10: IF PEEK m(n)=79 THEN  GO
TO 5000
1090 NEXT n
1100 BEEP .005,60
```

BRIGHT SPRITES

Andrew Clarke considers the plight of colliding sprites in the final article of his programming series for the C64

The sprites on a C64 are equipped with a sophisticated feature known as a collision detect. Using this we can find out when a particular sprite hits something on the screen.

Furthermore we can discover if it has hit another sprite or a background graphic. And when a sprite collides with another we can PEEK a register to see which sprites are involved.

The sprite-to-sprite collision detection register is at location 53278. If using the variable V, as in the other articles where V = 53248, then we refer to this as V + 30. The sprite-to-background collision detection register is at location 53279, or V + 30.

These are unusual locations in that we have to read them using PEEK than POKEs. The only time it is wise to alter this rule with locations V + 30 and V + 31 is before you go into a main program loop. Normally they will contain odd values that will give false readings when PEEKed in the program. A simple POKEV + 30,0 will do the trick.

Fortunately both registers are automatically cleared when PEEKed. This is helpful in a game with a single sprite that must not hit anything else. A simple line in the main loop like this will be ideal:

```
IF(PEEK(V + 30)AND1) = 1
    THEN.......
```

After the THEN statement tell it to GOTO or GOSUB an "end of life" routine, or as shown in the previous article on animation use an explosion routine.

The value 1 refers to sprite zero. The table in the first article will aid you here with values for sprites. Combining values will only complete the part after the THEN statement IF both sprites collide. Similarly the V + 30 could be replaced with V + 31; this time the IF.... THEN statement is completed if the named sprite or sprites hit a background character.

There is no real way that I can get you familiar with these registers. They will only come with practice. The best way is to write a one sprite game and then develop on the idea. My first ever game was called Spaceshot Nimbus and was published in HCW 76. It (if I may be so bold) is an excellent example of the sort of game a beginner should write.

It concerned a spaceship flying through an asteroid belt. The asteroids were character graphics (SHIFTed Q's) placed at random on the screen. The ship (powered by a FOR...... NEXT loop!) flew across the screen from left to right. The cursor keys controlled up and down movement.

In this case register V + 31 was PEEKed to check the collision with background graphics of the ship. If one had taken place then you lost one of your fifty shields. I quote this purely with the intention of getting you down at the keyboard and writing a game of your own. Try it!

Of course this single line IF.... PEEK..... THEN statement is fine for a one sprite game but when using more sprites you may need to store the value from the registers in a variable. This way you can GOSUB a routine that will analyse the value and act on it.

Take another game example, this time in the platform and ladders mould. You have one sprite as the main character. The others consist of four terror robots, intent on the death of your main man, and three friendly fuel cans designed to replenish him.

Now here is a sprite problem to solve. If your man hits a robot he will die. If he hits a fuel can he will simply gain energy and points, and the can will vanish as if picked up. Finally if a robot passes a can nothing will happen. Puzzled?

Let us analyse it. The main character is the central element in both collisions — with robots and cans. So if a collision happens and he is not involved then we do not need to bother.

The sprites are laid out as follows;

Also note that the robots will pass behind the fuel cans as they have a lower priority rating.

So the main program might contain a line like:

```
CO = PEEK(V + 30):IF(CO
    AND1) = 1THENGOSUB
    1000
```

Earlier we checked if Fred was involved. If the routine (the

FRED (our hero)	sprite Zero	value = 1
Fuel Can 1	sprite One	value = 2
Fuel Can 2	sprite Two	value = 4
Fuel Can 3	sprite Three	value = 8
Robot 1	sprite Four	value = 16
Robot 2	sprite five	value = 32
Robot 3	sprite six	value = 64
Robot 4	sprite seven	value = 128

collision variable analyser) was GOSUBed then he was obviously involved. If the three lines for the fuel cans produced no results then clearly the collision was with a robot — it does not matter which one in most games. Therefore we don't need more than one extra line which will say what happens when Fred hits a robot.

Hopefully these practical examples will encourage you that it isn't that hard. True it is not easy but with time it does come. You may not believe me but trial and error lead (almost) to perfection. It really needs a few hours of practice a week to get competent.

This is the final article in the series and I do hope that you

have learnt something from it. I deliberately set out to avoid technicalities as I believe they hold up learning.

A good many books are available, and I recommend the infamous Programmer's Reference Guide for the C64.

Finally, good luck and let's hope we see some excellent examples of what you have learnt in HCW very soon!

This assigns the value from the sprite-to-sprite collision register to the variable CO. THE IF.... THEN statement merely says that if sprite zero has its value of 1 contained in CO then GOSUB1000 — where we might have an analysation routine allocated in our program. If the 1 is not there then the collision

may have been just involving robots and/or fuel cans.

What about the analyser? It sounds a little complex but it is really an extension of our first single sprite IF....THEN statement, except we no longer need to PEEK(V + 30) as it is held by CO. So we may say;

IF((COAND3) = 3)THEN SC = SC + 100:POKEV + 21, (PEEK(V + 21)-2):RETURN

This instructs the computer that if sprites zero and one have collided (Fred and Fuel Can 1) then increase the variable SC (where we may store our points score in a game). Next we need to make the can vanish as it has been used. The next piece does that by POKEing V + 21 with its previous value minus 2. So sprite one is switched off.

For the other fuel cans just alter the value from a 3 to a 5 and a 9 respectively. With a robot hitting Fred then perhaps you may use this sort of line:

IF((COAND17) = 17)THENLF = LF-1:GOSUB2000: RETURN

Again an explanation. If Fred hits Robot 1 (sprites zero and four collide) then decrease FRED's lives (the variable LF) and GOSUB2000, where with the use of animation we may have a "Death routine". We could repeat this line four times for each robot or simply forget the IF....THEN part and just have the LF-1 statement. WHY?

Earlier we checked if Fred was involved. If the routine (the collision variable analyser) was GOSUBed then he was obviously involved. If the three lines for the fuel cans produced no results then clearly the collision was with a robot — it does not matter which one in most games. Therefore we don't need more than one extra line which will say what happens when Fred hits a robot.

Hopefully these practical examples will encourage you that it isn't that hard. True it is not easy but with time it does come. You may not believe me but trial and error lead to (almost) perfection. It really needs a few hours of practice a week to get competent.

BBC GAME

WALL DESTROYER

The walls come tumbling down in this Breakout-type game from Jonathan Church for the BBC and Electron

Bomber, the foreman of a cowboy bricklaying company is trying to destroy the completed walls of his number one rivals. But as he bounces bombs towards the wall the brickies respond by lobbing masonry at him.

As Bomber is allergic to dust he wears a mask. If the masonry knocks his mask off he has to get a new one. There are only five masks available, but if Bomber can destroy a wall his reward is a new mask.

Suggested extensions

Although in the options page you are able to enter a number in the range 1-254, any number below 5 is treated as a 5, in the deflector, masonry and ball-speeds options. This is to stop the action becoming too fast.

If you want the action to be as quick as possible, you must change the 5's in lines 1840, 1960-2000 to 1's. This will then treat any number below 5 in these options as that number.

The keys chosen in the program are "Z" — left, "/" — right, "Return" — pause. These can be changed however.

The value for "Z" in line 400 and "/" in line 430 are their negative inkey values in hex. For the key of your choice, you must look up its negative inkey value, find what it is in hex, and substitute it into the relative line, as mentioned above (400 or 430).

To find what the negative number is in hex, proceed as follows. If you wanted key "Z" to go left, which as a negative inkey number of -98 type PRINT-98. This will give the answer 9E. Now substitute this in line 400. To change the pause key, the value in line 310, initially 13 must be changed to the ASCII value of the new key to be used.

It is also possible to change the times between successive appearances of the deflector and masonry and the speed of the timer. To alter the speed of the timer, change the value of

"realtime" in line 3230. If this value is less than 5, it will be treated as a 5, unless you change the 5 in line 1860 to something smaller.

For the deflector, alter the value of "deflectwait" in line 3230. For the masonry, alter the value of "masdelay" in line 3240. Do not make this less than 21 though.

How it works

350	print bat
510	move ball
610	move deflector
670	check if bat hits ball
1080	check colour of balls next point
1530	print wall
1840	end of screen, increases speed, checks speed. Sets up timer.
2080	print score
2940	prints border and initial score
2990	print option page
3120	sound on or off
3220	initialises variables
3330	sound for when a life is lost

```
10REM Wall Destroyer by J.R.Church
20REM
30*FX11,0
40oswrch=&FFEE:osbyte=&FFF4:osword=&FFF1:p
ointballxlo=&70:pointballxhi=&71:pointballylo
=&72:pointballyhi=&73:pointballcolour=&74:wal
lxlo=&75:wallxhi=&76:wallylo=&77:wallyhi=&78:
wallcolour=&79
50DIM batx 0,baty 0,baty1 0,batpicture 4,b
allx 0,bally 0,ballpicture 0,addxvelocity 0,a
ddyvelocity 0,brickcolour 0,row 0,counter 0,n
oofbricksleft 0,reddelay 0,yellowdelay 0,whit
edelay 0,balldelay 0,missout 0,batdelay 0
60wall=&D01:plotdata=&DBC:sou1=&DD4:sou2=&
DDC
70DIM wallY 0,score 1,hiscore 1,lives 0,to
uty 0,timedelay 0,screentime 0,ydelay 0,realt
ime 0,batspeed 0,deflectorspeed 0,movemasspee
d 0,deflectx 0,deflecty 0,deflectpic 3,deflec
tdir 0,defdel 0
80DIM mascount 0,masdelay 0,movemasdelay 0
,checkmas 0,masx 0,masy 0,maindefdel 1,deflec
twait 0,prog 1910,screen 0
90printindecscore=&991F:rndnogen=&AF51:?hi
score=220:?(hiscore+1)=5
100!sou1=&00FF0001:!(sou1+4)=&0002000A:!sou
2=&00FF0001:!(sou2+4)=&00010030
110VDU23,224,255,255,0,0,0,0,0,0,23,225,24,
60,126,126,126,60,24,23,226,255,255,3,3,3
,3,0,0,23,227,255,255,192,192,192,192,0,0,23,
230,255,255,255,255,255,255,255,0,23,231,254,
254,254,254,254,254,254,0,23,232,2,2,2,2,2,2,
2,2
120VDU23,233,128,128,128,128,128,128,128,12
8,23,234,129,129,129,129,129,129,129,129,23,2
35,255,127,63,31,15,3,0,0,23,236,255,254,252,
248,240,192,0,0,23,237,255,127,63,31,15,3,0,0
,23,238,0,254,124,56,56,16,16,16
130VDU23,239,189,189,189,189,189,189,189,18
9
140$wall=STRING$(16," "):$(wall+16)=STRING$
(85,CHR$230+CHR$231)
150FOR Z%=1 TO 5:READ N%:?(wall+N%)=32:?(wa
ll+1+N%)=32:NEXT
160DATA 16,50,84,118,152
170FOR N%=batpicture TO (batpicture+4):READ
batdata:?N%=batdata:NEXT
180DATA 32,226,224,227,32
```

```
  190FORN%=0 TO 23:READ Z%:?(&DBC+N%)=Z%:NEXT
  200DATA 25,4,0,0,255,0,25,5,0,0,92,0,25,5,5
6,0,92,0,25,5,56,0,255,0
  210FOR pass=0 TO 2 STEP 2
  220P%=prog
  230[OPT pass
  240JMP endofscreen
  250.start JSR setup
  260.begin JSR printbat
  270LDA bally:CMP#29:BCC ballstillinplay:DEC
lives:RTS
  280.ballstillinplay DEC timedelay:BNE onwar
d:LDA#100:STA timedelay:DEC screentime:BNE on
ward:LDA realtime:STA screentime:INC ydelay
  290LDA#17:JSR oswrch:LDA#3:JSR oswrch:LDA#3
1:JSR oswrch:LDA#0:JSR oswrch:LDA ydelay:JSR
oswrch:LDA#234:JSR oswrch:LDA ydelay:CMP#28:B
CC onward:RTS
  300.onward LDA missout:BNE skipmove:JSR mov
eball
  310.skipmove DEC missout:LDX#0:LDY#0:LDA#12
9:JSR osbyte:CPX#13:BNE go:JSR&FFE0
  320.go JSR movedeflector:JSR fallingmasonry
:LDA touty:CMP#1:BNE kji:RTS
  330.kji LDA noofbricksleft:BEQ lk:JMP begin
  340.lk JMP endofscreen
  350.printbat LDA#17:JSR oswrch:LDA#2:JSR os
wrch:LDA#31:JSR oswrch:LDA batx:JSR oswrch:LD
A baty:JSR oswrch:LDX#4
  360.batagain LDA batpicture,X:JSR oswrch
  370DEX:BPL batagain
  380LDA batdelay:BNE nokeypressed
  390LDA batspeed:STA batdelay
  400LDA#129:LDX#&9E:LDY#&FF
  410JSR osbyte
  420CPY#&FF:BEQ batleft
  430LDA#129:LDX#&97:LDY#&FF
  440JSR osbyte
  450CPY#&FF:BEQ batright
  460.nokeypressed DEC batdelay:RTS
  470.batleft LDA batx:CMP#2:BCS goleft:RTS
  480.goleft DEC batx:RTS
  490.batright LDA batx:CMP#15:BCC goright:RT
S
  500.goright INC batx:RTS
  510.moveball JSR checkballposition
  520LDA balldelay:STA missout:LDA#31:JSR osw
rch:LDA ballx:JSR oswrch:LDA bally:JSR oswrch
:LDA#32:JSR oswrch
  530LDA ballx:CLC:ADC addxvelocity:STA ballx
:LDA bally:CLC:ADC addyvelocity:STA bally
  540JSR checkballpointcolour:LDA pointballco
lour:CMP#0:BEQ ballhitnothing
  550JSR ballso
  560LDA bally:CMP deflecty:BNE speedball
  570LDA#0:STA addxvelocity:LDA#1:STA addyvel
ocity:LDA whitedelay:STA balldelay:JMP ballhi
tnothing
  580.speedball LDA wallY:CLC:ADC#11:CMP ball
y:BCC ballhitnothing:JSR whatballspeed:JSR ba
llposinwall:LDA addyvelocity:CMP#1:BNE goingd
own:LDA#&FF:STA addyvelocity:JMP ballhitnothi
ng
  590.goingdown LDA#1:STA addyvelocity
  600.ballhitnothing LDA#17:JSR oswrch:LDA#1:
JSR oswrch:LDA#31:JSR oswrch:LDA ballx:JSR os
wrch:LDA bally:JSR oswrch:LDA ballpicture:JSR
 oswrch:RTS
  610.checkballposition
  620.xbig LDA ballx:CMP#18:BNE xsmall:LDA#25
5:STA addxvelocity:JMP ysmall
  630.xsmall CMP#2:BNE ysmall:LDA#1:STA addxv
elocity
  640.ysmall LDA bally:CMP#3:BNE ybig:LDA#1:S
TA addyvelocity:RTS
  650.ybig CMP#28:BNE nochange:JMP checkifbal
lhitbat
  660.nochange RTS
  670.checkifballhitbat JSR batso:LDA batx:CM
P ballx:BNE trybat1
  680.leftendofbat
  690LDA ballx:CMP#2:BNE lef:RTS
 .700.lef
  710LDA addxvelocity
  720CMP#1:BEQ leftend:JMP looseaball
  730.leftend LDA#&FF:STA addxvelocity:STA ad
dyvelocity:RTS
  740.trybat1 LDA batx:CLC:ADC#1:CMP ballx:BN
E trybatmiddle
  750LDA addxvelocity:CMP#0:BNE trybat2
  760LDA#&FF:STA addxvelocity:STA addyvelocit
y:RTS
  770.trybat2 CMP#1:BNE trybat3
  780LDA#&FF:STA addyvelocity:LDA#0:STA addxv
elocity:RTS
  790.trybat3 LDA#&FF:STA addyvelocity:RTS
  800.trybatmiddle
  810LDA batx:CLC:ADC#2:CMP ballx:BNE trybate
nd
  820LDA addxvelocity:CMP#0:BEQ rnddirection
  830LDA#&FF:STA addxvelocity:RTS
  840.rnddirection
  850JSRrndnogen
  860LDA&2A:CMP#80:BCC ballgoleft
  870CMP#165:BCC ballgomid
  880LDA#1:STA addxvelocity:LDA#&FF:STA addyv
elocity:RTS
  890.ballgoleft LDA#&FF:STA addxvelocity:STA
addyvelocity:RTS
  900.ballgomid LDA#0:STA addxvelocity:LDA#&F
F:STA addyvelocity:RTS
  910.trybatend
  920LDA batx:CLC:ADC#3:CMP ballx:BNE trybatv
ervend
  930LDA addxvelocity:CMP#0:BNE trybatend2
  940LDA#1:STA addxvelocity:LDA#&FF:STA addyv
elocity:RTS
  950.trybatend2 CMP#1:BNE trybatend3
  960LDA#&FF:STA addyvelocity:RTS
  970.trybatend3 LDA#0:STA addxvelocity:LDA#&
FF:STA addyvelocity:RTS
  980.trybatveryend
  990LDA ballx:CMP#18:BNE rig:RTS
 1000.rig
 1010LDA batx:CLC:ADC#4:CMP ballx:BNE looseab
all
 1020LDA addxvelocity:CMP#&FF:BNE looseaball
 1030STA addxvelocity:LDA#1:STA addxvelocity:
RTS
 1040.looseaball
 1050RTS
 1060.batso LDX#sou1 MOD 256:LDY#sou1 DIV 256
:LDA#7:JSR osword:RTS
 1070.ballso LDX#sou2 MOD 256:LDY#sou2 DIV 25
6:LDA pointballcolour:ASL A:ASL A:ASL A:STA s
ou2+4:LDA#7:JSR osword:RTS
 1080.checkballpointcolour
 1090LDA#0:STA pointballxlo:STA pointballylo
 1100LDA ballx:STA pointballxhi
 1110LSR pointballxhi:ROR pointballxlo
 1120LSR pointballxhi:ROR pointballxlo
 1130LDA pointballxlo:CLC:ADC#24:STA pointbal
lxlo
 1140LDA pointballxhi:ADC#0:STA pointballxhi
 1150LDA#32:SEC:SBC bally:STA pointballyhi
 1160LSR pointballyhi:ROR pointballylo
 1170LSR pointballyhi:ROR pointballylo
 1180LSR pointballyhi:ROR pointballylo
 1190SEC:LDA pointballylo:SBC#16:STA pointbal
lylo
 1200LDA pointballyhi:SBC#0:STA pointballyhi
 1210LDA pointballxlo:STA wallxlo
```

```
1220LDA pointballxhi:STA wallxhi
1230LDA pointballylo:STA wallylo
1240LDA pointballyhi:STA wallyhi
1250.checkpoint LDX#pointballxlo MOD 256
1260LDY#pointballxlo DIV 256
1270LDA#9:JSR osword:RTS
1280.whatballspeed
1290DEC noofbricksleft
1300LDA#31:JSR oswrch:LDA#3:JSR oswrch:LDA#1
:JSR oswrch
1310LDA#17:JSR oswrch:LDA#3:JSR oswrch
1320LDA pointballcolour
1330CMP#1:BNE notredspeed
1340LDA score:CLC:ADC#30:STA score:STA&2A
1350LDA score+1:ADC#0:STA score+1:STA&2B
1360JSR printindecscore
1370JSR printhiscore
1380LDA reddelay:STA balldelay:STA missout:R
TS
1390.notredspeed CMP#2:BNE notyellowspeed
1400LDA score:CLC:ADC#20:STA score:STA&2A
1410LDA score+1:ADC#0:STA score+1:STA&2B
1420JSR printindecscore
1430JSR printhiscore
1440LDA yellowdelay:STA balldelay:STA missou
t:RTS
1450.notyellowspeed
1460LDA score:CLC:ADC#10:STA score:STA&2A
1470LDA score+1:ADC#0:STA score+1:STA&2B
1480JSR printindecscore
1490JSR printhiscore
1500LDA whitedelay:STA balldelay:STA missout
:RTS
1510.setup LDA#10:STA batx:STA ballx:LDA#29:
STA baty:LDA#27:STA bally:LDA#&FF:STA addyvel
ocity:LDA#1:STA addxvelocity:LDA#225:STA ball
picture
1520RTS
1530.printwall LDX#0
1540LDA#31:JSR oswrch:LDA#0:JSR oswrch:LDA#4
:JSR oswrch
1550LDA#28:JSR oswrch:LDA#2:JSR oswrch:LDA#2
8:JSR oswrch:LDA#18:JSR oswrch:LDA wallY:JSR
oswrch
1560LDA#12:JSR oswrch
1570.startwall LDA wall,X:JSR oswrch
1580LDA wall+1,X:JSR oswrch
1590JSR getcolour
1600.gotcolour INX:INX
1610LDA#17:JSR oswrch:LDA brickcolour:JSR os
wrch
1620CPX#186
1630BNE startwall
1640LDA#26:JSR oswrch
1650RTS
1660.getcolour
1670TXA:PHA
1680JSR rndnogen
1690PLA:TAX
1700LDA&2A:CMP#80:BCC less
1710CMP#160:BCC abitless
1720LDA#1:STA brickcolour:RTS
1730.less LDA#2:STA brickcolour:RTS
1740.abitless LDA#3:STA brickcolour:RTS
1750.ballposinwall
1760LDA wallxlo:CLC:ADC#32:STA wallxlo
1770LDA wallxhi:ADC#0:STA wallxhi
1780LDX#wallxlo MOD 256:LDY#wallxlo DIV 256
1790LDA#9:JSR osword
1800LDA wallcolour:CMP#0:BEQ deletelefthalfo
fbrick
1810LDA#31:JSR oswrch:LDA ballx:CLC:ADC#1:JS
R oswrch:LDA bally:JSR oswrch:LDA#32:JSR oswr
ch:RTS
1820.deletelefthalfofbrick
1830LDA#31:JSR oswrch:LDA ballx:SEC:SBC#1:JS
```

```
R oswrch:LDA bally:JSR oswrch:LDA#32:JSR oswr
ch:RTS
1840.endofscreen DEC movemasspeed:LDA movema
sspeed:CMP#5:BCS msok:LDA#5:STA movemasspeed:
.msok DEC deflectorspeed:LDA deflectorspeed:C
MP#5:BCS dsok:LDA#5:STA deflectorspeed
1850.dsok LDA deflectwait:SEC:SBC#1:STA defl
ectwait:CMP#4:BCS rti:LDA#1:STA deflectwait
1860.rti DEC realtime:LDA realtime:CMP#5:BCS
tok:LDA#5:STA realtime
1870.tok INC lives:INC screen:LDA masdelay:S
EC:SBC#20:STA masdelay
1880CMP#1:BCS tooslow:LDA#1:STA mascount
1890.tooslow LDA#31:JSR oswrch:LDA deflectx:
JSR oswrch:LDA deflecty:JSR oswrch:LDX#3:LDA#
32
1900.deldeflec JSR oswrch:DEX:BNE deldeflec
1910LDA#80:STA noofbricksleft:INC wallY
1920LDA wallY:CLC:ADC#12:STA deflecty
1930LDA wallY:CMP#11:BCC brickcheck:LDA#7:ST
A wallY
1940.brickcheck
1950DEC reddelay:DEC yellowdelay:DEC whitede
lay
1960LDA reddelay:CMP#5:BCS checkyel:LDA#5:ST
A reddelay
1970.checkyel
1980LDA yellowdelay:CMP#5:BCS checkwhi:LDA#5
:STA yellowdelay
1990.checkwhi
2000LDA whitedelay:CMP#5:BCS speedok:LDA#5:S
TA whitedelay
2010.speedok JSR printwall
2020.ti LDX#28:LDA#17:JSR oswrch:LDA#1:JSR o
swrch
2030.printtimer LDA#31:JSR oswrch:LDA#0:JSR
oswrch:TXA:JSR oswrch:LDA#239:JSR oswrch:DEX:
CPX#25:BCS printtimer:LDA#17:JSR oswrch:LDA#3
:JSR oswrch:CPX#2:BNE printtimer
2040LDX#0:.pdat LDA plotdata,X:JSR oswrch:IN
X:CPX#24:BNE pdat
2050LDA#2:STA ydelay
2060RTS
2070JMP start
2080.printhiscore LDA score+1:CMP hiscore+1:
BNE couldbehi:LDA score:CMP hiscore:BCC nopri
nthiscore
2090.couldbehi CMP hiscore+1:BCC noprinthisc
ore:LDA score:STA hiscore:STA&2A:LDA score+1:
STA hiscore+1:STA&2B:LDA#31:JSR oswrch:LDA#14
:JSR oswrch:LDA#1:JSR oswrch
2100JSR printindecscore
2110.noprinthiscore
2120RTS
2130.movedeflector
2140DEC maindefdel+1:BEQ movedef2:RTS
2150.movedef2
2160LDA deflectwait:STA maindefdel+1
2170DEC maindefdel:BEQ movedef1
2180RTS
2190.movedef1
2200LDA#1:STA maindefdel:STA maindefdel+1
2210DEC defdel:BEQ movedef:RTS
2220.movedef
2230LDA deflectorspeed:STA defdel
2240LDA deflectx:CLC:ADC deflectdir:STA defl
ectx
2250LDA#17:JSR oswrch:LDA#2:JSR oswrch
2260LDA#31:JSR oswrch:LDA deflectx:JSR oswrc
h:LDA deflecty:JSR oswrch:LDX#3
2270.printdeflect LDA deflectpic,X:JSR oswrc
h:DEX:BPL printdeflect:CMP#15:BEQ deletedef
2280CMP#15:BEQ deletedef
2290.defleft CMP#2:BNE end
2300.deletedef
2310LDA#200:STA maindefdel:LDA deflectwait:S
```

```
TA maindefdel+1
  2320LDA#31:JSR oswrch:LDA deflectx:JSR oswrc
h:LDA deflecty:JSR oswrch:LDX#3:LDA#32
  2330.printdef JSR oswrch:DEX:BNE printdef
  2340JSR rndnogen
  2350LDA&2A:AND#1
  2360BEQ changetoright
  2370LDA#&FF:STA deflectdir:LDA#15:STA deflec
tx
  2380RTS
  2390.changetoright
  2400LDA#1:STA deflectdir:LDA#2:STA deflectx
  2410RTS
  2420.end
  2430RTS
  2440.fallingmasonry:DEC mascount:BEQ masonry
2:RTS:.masonry2 LDA#1:STA mascount:LDA checkm
as:CMP#1:BEQ updatemas:LDA#1:STA checkmas
  2450JSR rndnogen:LDA&2A:LSR A:LSR A:LSR A:LS
R A:CLC:ADC#2:STA masx
  2460.updatemas
  2470DEC movemasdelay:BEQ updatemas1:RTS
  2480.updatemas1
  2490LDA movemasspeed:STA movemasdelay
  2500INC masy
  2510LDA#17:JSR oswrch:LDA#3:JSR oswrch
  2520LDA#31:JSR oswrch:LDA masx:JSR oswrch:LD
A masy:JSR oswrch:LDA#31:JSR oswrch:LDA#8:JSR
oswrch:LDA#10:JSR oswrch:LDA#238:JSR oswrch
  2530LDA masy:CMP#28:BEQ masmayofhitbat
  2540RTS
  2550.masmayofhitbat
  2560JSR hasmashitbat
  2570LDA#0:STA checkmas
  2580LDA masdelay:STA mascount
  2590LDA wallY:CLC:ADC#12:STA masy
  2600LDA#31:JSR oswrch:LDA masx:JSR oswrch:LD
A#29:JSR oswrch:LDA#32:JSR oswrch
  2610RTS
  2620.hasmashitbat
  2630LDA batx:CMP masx
  2640BCC masgreaterleftbat:RTS
  2650.masgreaterleftbat
  2660LDA batx:CLC:ADC#3:CMP masx
  2670BCS mashashitbat:RTS
  2680.mashashitbat
  2690INC ydelay
  2700LDA#7:JSR oswrch
  2710LDA#17:JSR oswrch:LDA#3:JSR oswrch
  2720LDX#3
  2730.typ LDA#31:JSR oswrch:LDA#0:JSR oswrch:
LDA ydelay:JSR oswrch:LDA#234:JSR oswrch
  2740INC ydelay
  2750LDA ydelay:CMP#28:BCS ohno
  2760DEX:BNE typ
  2770DEC ydelay
  2780RTS
  2790.ohno LDA#1:STA touty:RTS
  2800]
  2810NEXT
  2820PROCinit:MODE4:PROCoptions:MODE5:VDU23,1
,0:0:0:0::PROCscreen
  2830CALL prog
  2840VDU23,1,0:0:0:0:0:
  2850COLOUR3:PRINT TAB(10,1);?lives:TAB(C,1):
?screen
  2860IF ?lives=0 THEN 3270
  2870IF ?ydelay>=28 CALL ti:PRINT TAB(?ballx,
?bally);" ":?lives=?lives-1:PROCdie:GOTO2850
  2880IF ?bally>=28 PROCdie ELSE FORN%=20 TO 1
00 STEP4:SOUND1,-15,N%,1:NEXT
  2890COLOUR1:PRINT TAB(3,4);"PRESS   SPACEBAR"
;TAB(5,6);"TO CONTINUE"
  2900REPEAT:key=GET:UNTIL key=32
  2910PRINT TAB(3,4);SPC(15);TAB(4,6);SPC(12):
TAB(1,29);SPC(18):?touty=0
```

```
  2920CALL start
  2930GOTO 2850
  2940DEF PROCscreen
  2950MOVE112,928:PLOT1,1108,0 :FOR side%=3 TO
27:PRINT TAB(1,side%);CHR$232;TAB(19,side%);
CHR$233:NEXT
  2960PRINT TAB(3,0);"SCORE";TAB(13,0);"HISCOR
E";TAB(10,0);"L";TAB(0,0);"S"
  2970PRINT TAB(3,1);"0";TAB(14,1);(?(hiscore+
1)*256+?hiscore)
  2980ENDPROC
  2990DEF PROCoptions
  3000PRINT TAB(12,1);"Wall Destroyer";TAB(12,
2);"_____";TAB(1,6);"1) Enter ballsp
eed (1-254)";TAB(1,10);"2) Enter batspeed (1-
254)";TAB(1,14);"3) Enter deflectorspeed (1-2
54)";TAB(1,18);"4) Enter masonryspeed (1-254)
"
  3010PRINT TAB(1,22);"5) Sound ON/OFF";TAB(1,
25);"'Z'-left '/'-right  'RETURN'-pause";TAB
(1,28);"Press SPACEBAR to play"
  3020VDU23,1,0:0:0:0::REPEAT:key=GET:UNTIL ke
y>48 AND key<54 OR key=32
  3030IF key=32 ENDPROC
  3040IF key=53 PROCsound:GOTO 3020
  3050VDU23,1,1:0:0:0::PRINT TAB(4,(key-48)*4+
4);SPC(35);TAB(4,(key-48)*4+4);"Please enter
speed..";
  3060INPUT speed;
  3070IF speed<1 OR speed>254 THEN PRINT TAB(2
4,(key-48)*4+4);SPC(15):GOTO 3050
  3080IF key=49 THEN ?balldelay=speed:?reddela
y=speed:?whitedelay=speed+2:?yellowdelay=spee
d+4
  3090IF key=50 THEN ?batspeed=speed ELSE IF k
ey=51 THEN ?deflectorspeed=speed ELSE IF key=
52 THEN ?movemasspeed=speed
  3100PRINT TAB(28,(key-48)*4+4);"  OK"
  3110GOTO 3020
  3120DEF PROCsound
  3130IF S%=0 THEN 3160
  3140*FX210,1
  3150S%=0:GOTO 3180
  3160*FX210,0
  3170S%=1
  3180IF S%=1 THEN PRINT TAB(20,22);"ON " ELSE
PRINT TAB(20,22);"OFF"
  3190FOR N=1 TO 200:NEXT
  3200*FX15
  3210ENDPROC
  3220DEF PROCinit
  3230?batspeed=10:?deflectorspeed=20:?movemas
delay=10:?maindefdel=2:?(maindefdel+1)=3:?def
lectwait=10:?deflectx=3:?deflectdir=1:?deflec
ty=19:!deflectpic=&20EBEC20:?lives=4:?timedel
ay=100:?realtime=15:?screentime=?realtime
  3240?reddelay=15:?yellowdelay=17:?whitedelay
=19:?touty=0:?balldelay=15:?missout=1:?score=
0:?(score+1)=0:?counter=1:?brickcolour=1:?mas
delay=255:?mascount=?masdelay:?movemasdelay=2
2:?movemasspeed=22:?masy=19:?checkmas=0
  3250?wallY=6:?screen=0:?bally=27
  3260ENDPROC
  3270RESTORE3320:FORN%=1 TO 11:READ P%,D%:SOU
ND1,-15,P%,D%:NEXT
  3280FORN=1 TO 3000:NEXT:VDU28,2,29,18,3:CLS:
COLOUR1:PRINT TAB(4,5);"GAME OVER":COLOUR3:PR
INT TAB(1,10);"PRESS  SPACEBAR";TAB(2,14);"TO
PLAY AGAIN"
  3290*FX15,1
  3300REPEAT:key=GET:UNTIL key=32
  3310GOTO 2820
  3320DATA52,7,0,0,52,7,0,0,52,4,52,4,68,5,60,
7,52,7,48,4,52,7
  3330DEF PROCdie:FORN%=80 TO 20 STEP-4:SOUND1
,-15,N%,1:NEXT:ENDPROC
```

IT'S A GAME

It's school geometry for Amstrad owners this week with Dave Ellis explaining the concepts of scaling and rotation

This week it's back to school for some geometry lessons, but don't be alarmed as it's not as bad as it sounds!

We'll use the whole of the screen for the graphics so reset the machine and type in:-

```
10 CLS : ORIGIN 320,200
20 DRAW 100,0 :
   DRAW 100,100
30 DRAW 0,100 :
   DRAW 0,0
```

If you RUN the program it will draw a square. Nothing very exciting here — no doubt you've used it often. The main drawback to it is that you're stuck with a size of 100 pixels. If you want to draw another square of say 150 pixels then you will need to type out another lot of DRAW commands.

A far better idea is to draw a very small square as shown in Figure 1. Starting at 0,0 the coordinates are at 4,0 4,4 0,4 and 0,0 to complete the square. The size of the square can now be 'scaled' as demonstrated in the following program:

```
10 READ points
20 FOR lines = 1 TO points
30 READ x : READ y
40 DRAW x * scale, y * scale
50 NEXT lines
60 DATA 4,4,0,4,4,0,4,0,0
```

Clear the screen and RUN the program. A small dot will appear. We haven't included the scale size or the ORIGIN! Add the following line and try again:

```
5 ORIGIN 320,200 :
  SCALE = 10
```

Now RUN the program again and this time a square of 40 pixels will be drawn (4 pixels * scale of 10). The first value given in the DATA statement, by the way, is the number of x,y co-ordinates. Alter the scale and ORIGIN in line 5 and you can draw any size square anywhere on the screen.

Any shape can be drawn in a similar manner by plotting shapes on a grid as shown in figure 2. This uses negative co-ordinates as well, and the resulting shape is similar to an egg-timer. There are five co-ordinate pairs so replace line 60 with:

```
60 DATA 5,3,3,-3,3,3,-3,-3,-3,
   0,0
```

and RUN the program again using different scale sizes. Using the same technique any

1. Square

Figure 1

2. Timer

Figure 2

CO-ORDINATE

X

ANGLE

Y
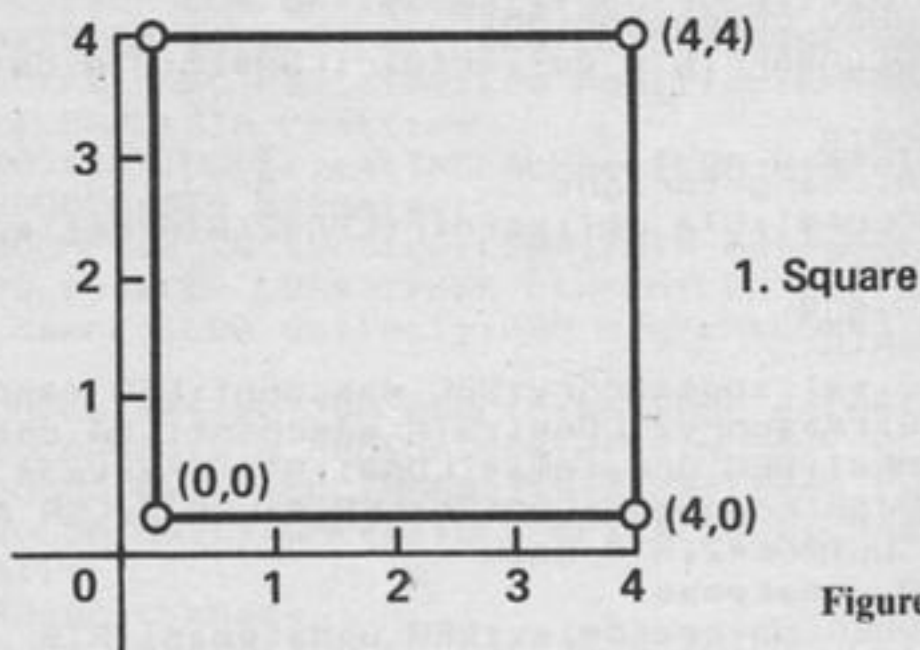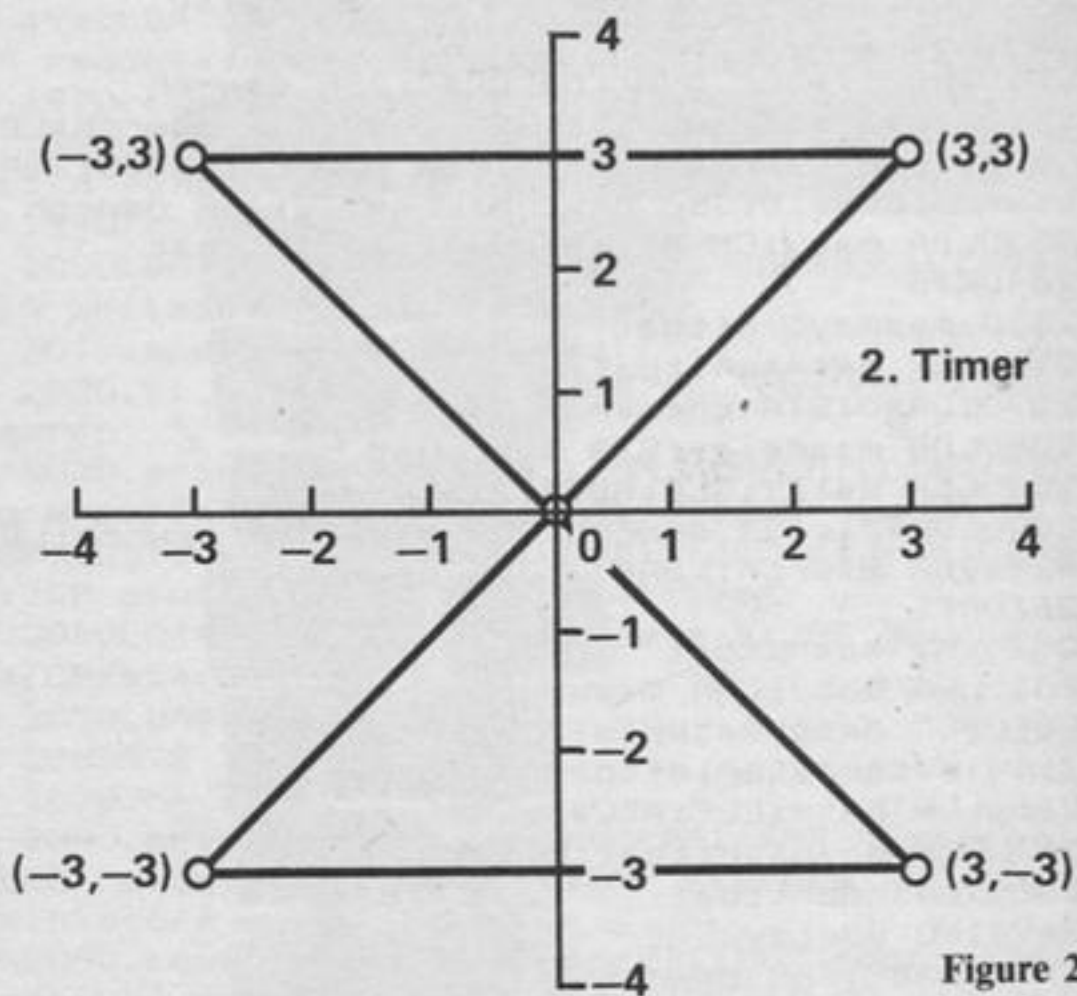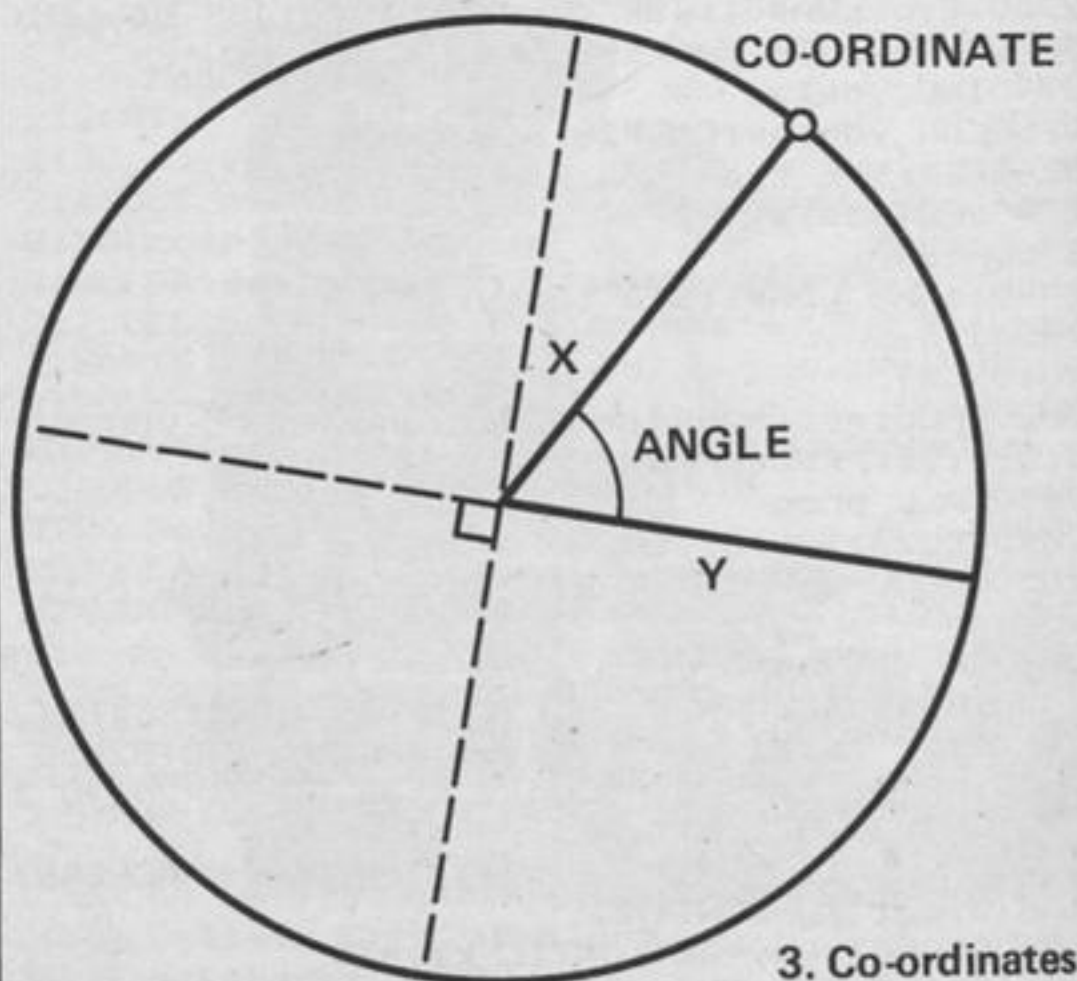
3. Co-ordinates

Figure 3

shape could be drawn consisting of as many co-ordinate pairs as needed. Try and draw the shape as small as possible to give as large a range of scale sizes as possible.

Of course it would be better to hold the co-ordinates for each shape in an array and then call a common subroutine passing the values of shape, scale, colour and origin at the same time. The angle of rotation could also be passed to the subroutine which brings us nicely on to the subject.

Rotation

Here's where the geometry comes in! Referring to figure 3, the co-ordinates of a point on a circle (or more correctly an elipse) are found by using the formulae:
COS(ANGLE) * X ....
SIN(ANGLE) * Y
The co-ordinates will be relative to the centre of the circle.

When the lengths of X and Y are equal the co-ordinates will be that of a circle. Try the following program which will demonstrate this:
10 DEG : CLS
20 X = 100 : Y = 100
30 FOR angle = 0 to 359
40 ORIGIN 320,200
50 DRAW COS(angle) * X, SIN(angle) * Y
60 NEXT angle
Line 10 sets the Degrees mode as opposed to Radians. Line 40 sets the ORIGIN each time through the loop, and the result of running the program is to draw a nearly solid circle.

Try putting a STEP value on the end of the loop in line 30, say STEP 5, and you will see more clearly how the lines are drawn. Changing the values of X and Y will give different size circles (if X and Y are equal) or elipses. If X is larger than Y then the elipse will be elongated. If Y is larger than X the elipse will be the opposite (What's the opposite of elongate?)

Try changing the ORIGIN in line 40 to ORIGIN angle, angle and also with a STEP value of 4 in line 30 for a nice effect. Experiment and I am sure you will find lots of interesting shapes and patters to draw. The program **HCW SCALE & ROTATE** uses a similar effect to rotate the three shapes (a H, C and W !) around their 0,0 ORIGIN.

A little more geometry is required here which takes place in sub-routines 1000, 2000 and 3000 to find the new rotated position of the co-ordinate pair. The co-ordinates for the three shapes are read in by lines 30 to 80 and are held in a two dimensional array — pointx and pointy.
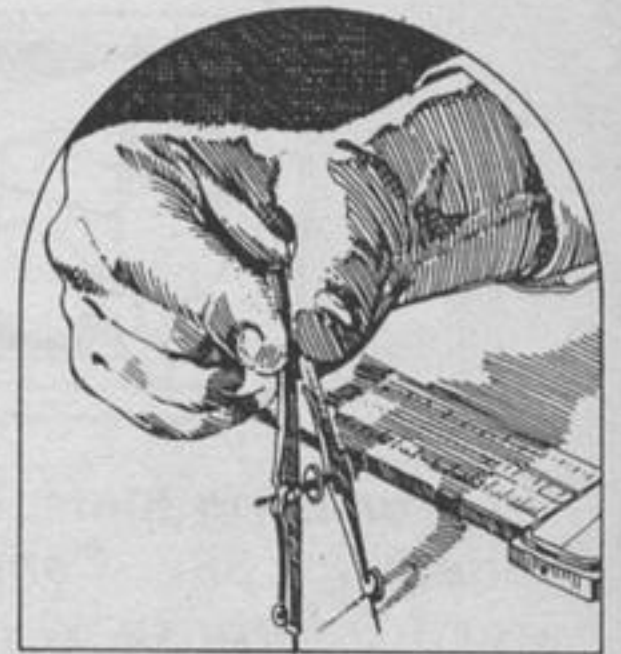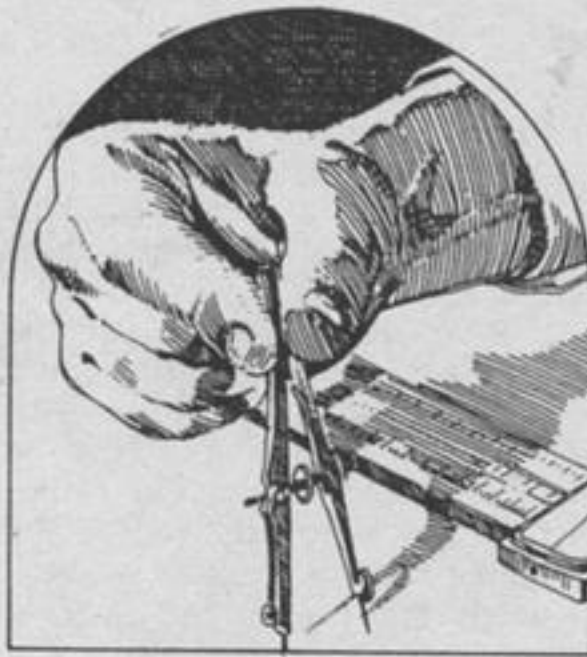
Line 90 sets the scale size and the angle to rotate, which in this case is part of a loop. This will rotate the shapes through a series of 60 degree turns.

Line 100 changes the PEN value for each rotation. Lines 110, 120 and 130 set the ORIGIN and the shape number, then CALL subroutine 4000 which calls the other subroutines on its way to drawing the rotated co-ordinates.

Any number of shapes could be held in DATA statements in a similar manner to lines 5010 to 5030, and drawn anywhere on the screen, in any colour, size and rotation. Experiment with different values and shapes etc. and you should soon realize the potential. In fact you may wish you had taken more notice of the teacher now in those geometry lessons as these hold the secrets to many fascinating methods of drawing.

In the next article we will start to look at various ways of making those graphics and text **move**.

```
10 DIM pointx(20,20),pointy(20,20),newx(100),newy(100)
20 MODE 1:CALL &BC02:DEG
30 FOR shape=1 TO 3:READ pointx(shape,0)
40    :FOR num=1 TO pointx(shape,0)
50    :READ pointx(shape,num):READ pointy(shape,num)
60    :IF pointx(shape,num)=0 THEN pointx(shape,num)=0.0001
70    :NEXT num
80 NEXT shape
85 '------------------------------------------------------
90 scale=14:FOR rotate=0 TO 359 STEP 60
100 pen.number=pen.number+1:IF pen.number=4 THEN pen.number=1
110 ORIGIN 100,300:shape=1:GOSUB 4000
120 ORIGIN 300,200:shape=2:GOSUB 4000
130 ORIGIN 500,100:shape=3:GOSUB 4000
140 NEXT rotate
999 END
1000 REM*********** CALCULATE ANGLE ************************
1010 angle=ATN(pointy(shape,z)/pointx(shape,z)):RETURN
2000 REM*********** CALCULATE LENGTH ***********************
2010 length=pointx(shape,z)/COS(angle):RETURN
3000 REM*********** CALCULATE NEW CO-ORDINATES **************
3010 newangle=angle+rotate
3020 newx(z)=length*COS(newangle):newy(z)=length*SIN(newangle)
3030 RETURN
4000 REM*********** DRAW ROTATED SHAPE *********************
4010 FOR z=1 TO pointx(shape,0)
4030 GOSUB 1000:GOSUB 2000:GOSUB 3000
4040 DRAW newx(z)*scale,newy(z)*scale,pen.number
4050 NEXT z:RETURN
5000 REM ********** DATA FOR SHAPES ***********************
5010 DATA 12,1,0,1,2,3,2,3,0,4,0,4,5,3,5,3,3,1,3,1,5,0,5,0,0
5020 DATA 12,4,0,4,2,3,2,3,1,1,1,1,4,3,4,3,3,4,3,4,5,0,5,0,0
5030 DATA 12,1,0,2,1,3,0,4,0,4,5,3,5,3,1,2,2,1,1,1,5,0,5,0,0
```
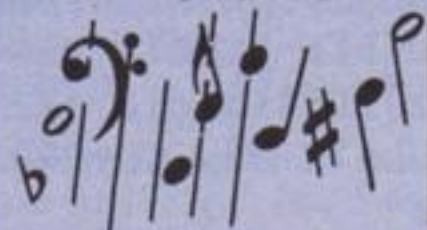
MUSIC AND THE MICRO

Programming hints, books, reviews and ideas for BBC, Commodore, Amstrad and Enterprise owners in this weeks music column from Clive Gifford

The C64 and the BBC are both blessed with powerful sound facilities, but so many users complain that while it is easy to summon a beep from their machine, producing complex sounds or music is far more difficult. These users may well find Gary Herman's new book an ideal solution.

Entitled, "Micro Music" and published by Papermac (a division of Macmillan), this book is written specifically for Commodore and BBC computers. These two machines may seem an odd couple to you, but the author does explain that at the time of writing these were the only two computers that had a large following and high-quality sound and music capabilities.

The book doesn't waste time in getting down to the technical details of making sound on your computer. After a short, interesting introductory chapter, the reader is led into the author's first thoughts on sound composition. All areas of sound synthesis are covered with much of the book devoted to the topics of controlling the frequency and amplitude of sounds. The book does take the reader step-by-step through all the fundamentals of creating sounds. Once this task is complete, it progresses onto the generation of noise effects and finally, a large and comprehensive chapter on "Real Music".

The most useful feature of this book is the number of example programs included in each chapter. Every major point or principle is illustrated by a programming example. The quality of these programs and routines is very high indeed. Buying this book will give the user a guitar chords

tutor, a real-time sequencer, a number of different music keyboards and a whole host of sound effects, demonstrations and tunes.

It is not designed for the beginner to computing, it's more suitable for those with some programming ability or musical knowledge. The rather technical style can lead to the reader becoming a little bogged-down but overall, at £8.50 a copy it's a very good buy if you own a C64 or a BBC. I hope that Mr Herman considers bringing out either a new book or a supplement to let Amstrad, MSX and Enterprise owners also tap the musical potential of their machines.

The Enterprise and the Amstrad make up the rest of this issue's piece. Firstly, an Amstrad sound tip and then a brief discussion of how the Enterprise's sound works.

The Amstrad's ENV command can be used to create complex sounds very quickly. The following two-line program produces a warbling tone which is quite effective.

```
10 ENT-1,5,5,1,10,-5,1,5,1,1
20 SOUND 1,500,500,7,0,1
```

The second routine is a little more complex and uses the Amstrad's system interrupts to generate a simple bass rhythm behind a rising melody. Using the EVERY command, the computer jumps from the main routine to play the bass note every 30/50ths (3/5ths) of a second. The bass note itself does vary with the value of the melody. Thus, as the melody rises, the bass note's pitch rises. The other feature of the bass note happened by accident. The bass note was planned to rise as

the melody's pitch, held in the variable T, rose. Of course, I had used T as the pause variable in line 190 as well. Thus, the bass note gets considerably deeper while there is a pause between the playing of melodies. It sounded good so I left it in.

With the REM statements included, I think that the program explains itself. With this as a programming base, start to fiddle around with the time values and maybe replace my melody with your own. This is the best way to improve your understanding of the sound and music commands on the Amstrad and this principle applies with any computer.

```
100 '       INTERRUPTS IN USE
110 '
120 EVERY 30 GOSUB 210
130 FOR T=250 TO 70 STEP-15
140 SOUND 1,T,20,11
150 NEXT
160 '
170 '     PAUSE BEFORE MELODY STARTS
180 '
190 FOR T=1 TO 2850:NEXT:GOTO 130
200 '
210 '     PLAY VARIABLE BASS NOTE
220 '
230 SOUND 2,500+T,20,12
240 RETURN
```

The Enterprise is gradually making more of an impact on the computing scene. Its features speak for themselves and in the sound department, the machine boasts three channel, four voice stereo sound capabilities. In the next "Music And The Micro", I'll be going into some detail of the Enterprise sound facilities, but until then here's just a brief mention of the main command: SOUND. Followed by up to 10 different parameters, SOUND needs at the minimum a pitch value.

Unlike SOUND commands found on most of the other popular home computers, the Enterprise's version needs the word PITCH followed by a value — as is the case with the other parameters. The length of a note is controlled by DURATION followed by a number. This may sound confusing but results in listings with each sound parameter neatly documented making debugging and alteration far easier than usual. An example SOUND command would be SOUND PITCH 40, DURATION 40.

If you are a music buff you might consider Yamaha's CX-5M computer to indulge yourself with. Robert Orchin gives his frank opinion of its capabilities

BEATLES TO BEETHOVEN

In the past year and a half there has been a quite phenomenal change in the amount and quality of software and hardware for both the new breed of computerised musicians and the musically inclined computer buff. Most of this new soft and hardware is for the BBC and CBM 64 computers, both of which were hailed at their respective launches because of their musical capabilities.

A little while ago, however, there emerged the Yamaha CX-5M music computer, a computer with enough potential to completely overshadow both the other machines. It is not a cheap computer, indeed at £499 many people have expressed doubts as to whether or not it will reach a wide enough section of the public to be economically viable.

From the outside it looks very much like another member of the ever growing MSX family of computers. It has a two tone brown exterior, and this gives the computer a superior air from the moment you first see it. It has a cartridge socket, a pad of cursor keys and a full length space bar. In fact the only real difference between its keyboard and most others is a blank key that can be used for accents when typing a foreign language.

The sides of the computer are rather boring, with only the joystick, centronics, and monitor sockets. The major difference is the very ordinary looking din sockets, marked "MIDI in" and "MIDI out". These two sockets are a revelation.

Inside the computer there is a fully fledged synthesiser just waiting to communicate through MIDI with the whole world of MIDI compatible instruments. MIDI- the Musical Instrument Digital Interface allows a vast number of synthesisers and percussion machines to send digital information to each other.

Upon entering the command CALL MUSIC you will have unleashed perhaps the most powerful music computer on the market. The internal synthesiser has a repertoire of 46 predefined voices which can be accessed via the synthesiser mode and played using either, the computer keyboard, or one of the two musical keyboards available: a 44 note keyboard costing £85 or the 49 note keyboard which costs £165. Either keyboard can be split at any point to use two voices at once.

The great strength of this computer is the fantastic quality of its sound. It uses a new method of synthesising sound developed by Yamaha and used in both their DX-7 and DX-9 synthesisers. It works by using a fequency modulated wave and overlaying it with another wave containing the instrumental information.

Among the 46 preprogrammed voices are such things as the stunningly realistic harp and timpani drums, the more normal sounds of instruments such as the flute and the organs. Then of course there are the inevitable gimmicky sounds like the ambulance, raindrops and the bird chirps. All the voices, even the less stunning ones, are remarkably good.

Another development is the ability to play up to eight notes at a time. Compared to the three of both the BBC and the CBM64 this gives you some idea of the vast range the CX possesses. I feel that the CX's rhythm capabilities, for a computer of such potential, are feeble, to say the least. Even the most basic of music computers would probably be capable of the same output. The CX-5M is, however, able to record up to 2000 notes at a time and then play them back.

The software for the CD enhances it even more and at the moment there are four available. They are:

A voicing ROM, costing £36. It enables you to simplify the business of altering the preprogrammed voices and programming new ones. Without this piece of software making these changes would be a nightmare, to say the least.

Each sound consists of sixty or more integrated parameters, indeed even with the voicing ROM the task is still not easy and it requires a great deal of practice to work out how each parameter effects the sound and the other parameters. This program is valuable in that it shows you what is changing on a graphic display and comes with a comprehensive, but sometimes confusing, 48 pages manual.

The second ROM will be the one most used by the casual user. This macromusic ROM, also £36, allows you to play back up to eight different parts, using up to four different voices in each which can be either the pre-programmed voices or voices loaded from tape. The program allows the user to add up to 36 new commands to the BASIC to help control the synthesiser. It is also capable of defining new rhythms for use along with the pre-programmed rhythms. This program does, however, reduce the already limited 32K of RAM to 20K.

The third ROM is the Composer and will have greater appeal to the musician than the general user. It allows you to compose on screen, using either the musical or computer keyboard, a six part musical score which will be displayed in full musical notation, including dynamics, on the screen. This score can then be played back on either the internal synthesiser or a MIDI linked instrument. The music produced, if used with the dynamics, is absolutely breathtaking. It actually sounds like a human playing.

The fourth and final ROM is a very useful piece of software, if you own one of the Yamaha DX-7 synthesisers, because it allows almost complete compatibility and inter-programming, making a very powerful system indeed.

To conclude

The main strengths of the CX are the quality of its sound and its MIDI interface. It should be of interest to both the musician and the computer buff. It will be an extremely good educational tool when other software is available.

Although there are a couple of disappointments, the rhythm and the memory space being the main ones, however, it is an extremely good buy for anyone interested in music, especially if you have an instrument from the Yamaha DX range already.

Price: £449

Manufacturer: Yamaha/Kemble

Address: 1 Mount Ave, Mount Farm, Milton Keynes MK1 1JE

Watson's Notes 1 & 2
First Steps in BASIC & Exploring BASIC

These two books, part of a series of six, are new products from the Dr Watson stable. This company has identified the fact that with the explosion in the computer market there would be an accompanying demand for texts teaching all aspects of programming. After preliminary sorties into machine code and BASIC, they have produced this brightly coloured series.

Rather than produce a meaty volume costing £10, this is a series of thinnish books each costing £2.95 (pocket money prices?). Volume 1, First steps in BASIC, gets the student used to the machine by giving simple exercises on the keyboard. This includes using the screen editor to alter text, colours and reverse field operations. This is then extended into how to use the machine in immediate mode to perform calculator type exercises. The final section of the book starts on simple programming and as such concentrates on the creation of simple graphics effects and animation.

Exploring BASIC (volume 2) continues the process of developing programming skills and examining the features of BASIC. The main areas covered are loops and variables with graphical routines to demonstrate their use.

Both volumes are clearly laid out with plenty of examples to try and help revision. The tempo is gentle and should be acceptable to most beginners.

Overall I got the distinct impression that the material covered in each book was rather on the thin side. Whilst each volume is cheap in itself, I feel that the quantity of material was such that the value for money is less than other more comprehensive works. The other books in the series cover further areas of BASIC, graphics and more advanced concepts.

Overall they are well made books which are a little overpriced. I suggest you look at these and the opposition before buying. **A.W.**

Price: £2.95

Publisher: Glentop Publishers Ltd.

Address: Standfast Hse, Bath Pl, High St, Barnet, Herts.

C64

Peeks and Pokes Commodore 64

This book is a bit of an oddity which cannot be placed readily into the normal categories. Whilst being somewhat educational, it is more of a reference work providing a wealth of information.

We all know the little wheezes, kludges, tweaks and other gems which people come up with from time to time. The author of this book has collected a mountain of such items and combined them with information of a more substantial nature.

It's difficult to give a thumb nail sketch of the contents, but needless to say it covers sound, graphics, sprites, machine code and many other areas. There is some structure to the book but it's rather loose and laid back. The feel is that it's aimed at the relative newcomer and as such has great appeal.

Rather than slog through the bits on sound and graphics which are rather standard and cover no new ground, I'll deal with the handier bits. From the ideas put forward, it's clear that the author has given great thought to the book. A nice example is the provision of two machine code routines for PEEKing and POKEing under the ROM areas. Easy to do if you know how, but very handy to most users. There are utilities for many useful operations and countless handy POKEs for just about anything you can think of.

Overall, a great little number which is a worthy addition to any library. **A.W.**

Price: £7.95

Publisher: First Publishing Ltd.

Address: Unit 20B, Horseshoe Rd., Horseshoe Pk, Pangbourne, Berks.

C64
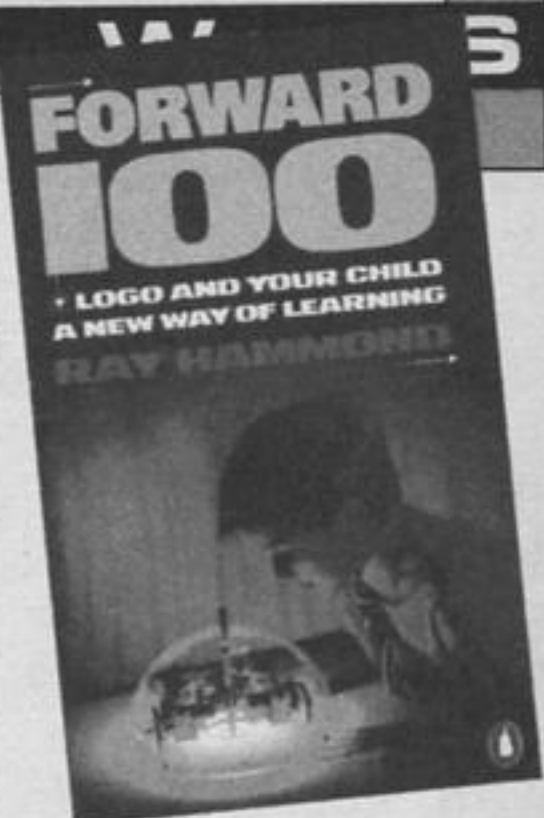
Forward 100

This book is subtitled "Logo and your child: a new way of learning" and sets out to introduce Logo to parents and teachers.

It is a book about Logo — not a book which teaches Logo. The author, Ray Hammond, is clearly a strong supporter of the language and his aim is to fire his readers with some of his own enthusiasm so that they will rush off to learn it and teach it to their children — or rather, allow their children to explore it by themselves, with the minimum of adult guidance and help.

The early chapters describe the educational theories behind the development of Logo, and the research which has been carried out to determine its effectiveness as an educational tool. These are followed by explanations of the use of floor and screen turtles, and the application of Logo to the control of sprites and list-processing. Then there are descriptions of several different versions of Logo and the computers on which they are available, and a number of case studies which show how Logo has been used in different schools all round the world.

The book is interesting and thought-provoking, but I have considerable reservations about some of the ideas expressed in it. Whether the introduction of cheap computers will actually revolutionise primary education to the extent that Mr. Hammond suggests must surely still be open to dispute. If you have children of your own, or work with young children, then do read this book and decide for yourself how important these theories are. **M.N.**

Price: £5.95

Publisher: Penguin Books Ltd.

Address: Harmondsworth, Middlesex, England.

COMPUTERS IN SOCIETY
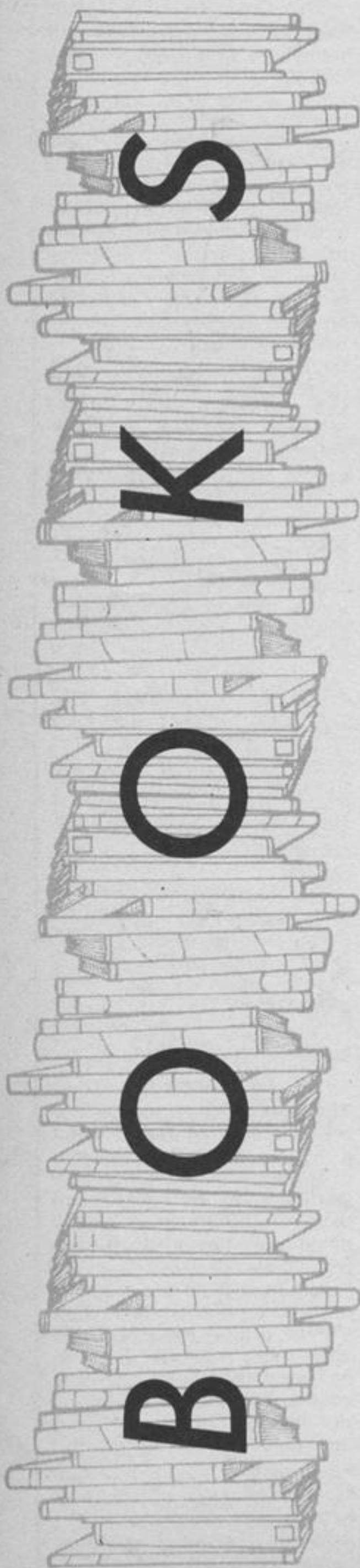
Our communications expert, Doreen Naylor, brings you the latest news on a TV programme for the disabled — in which she's a star! Proving that telecommunications do work she actually transmitted this article to us via her modem — and our printer did the rest!

HCW readers may be interested to know about the new TV series coming up shortly showing the uses and potential of micro-electronics for disabled people. Originally to be called "Micro-technology and the disabled" it has now been changed to "With a little help from the chip" which seems more appropriate and has a touch of humour about it! The series of six programmes were prepared by the BBC Continuing Education Dept and precedes the new series of "Micro Live".

I am sure you computer buffs will be interested to see how the disabled rely on micro-technology to enable them carry out a whole new range of everyday activities which most of us take for granted. For example . . . enabling the deaf to use the telephone, people with no arms to write letters and other activities for various degrees of disability.

And of course, yours truly will be featured in the second programme — with my sister-in-law who is also deaf — demonstrating micros back-to-back (a communication method used by the deaf). The camera crew spent some five hours filming my telecommunication activities using Telecom Gold (Electronic Mail), Prestel, Micronet, back-to-back chat and my 'Black Museum' of numerous modems and terminals. I even had to take off the top of my beeb so they could film the terminal Rom (Commstar) which I use for communication.

You can imagine the chaos in my seven foot square computer room which the producer baptised "Doreen's Den". My husband kept making sure that the film crew weren't tampering with my peripherals . . . although he did seem to spend a lot of time with a young lady TV assistant. After all this, my heart sank when I was told that the footage had been whittled down to just a few minutes!

To simplify the filming back-to-back in two separate locations, we hardwired the two micros using a long cable which was passed from my computer room to the lounge downstairs where my sister-in-law had her beeb and modem creating a mock link up. No doubt, with some judicious film editing it will appear that we are doing back-to-back communication via the telephone.

The programmes are on BBC2 and scheduled for repeat on BBC1, Monday afternoons, beginning 7th October 1985, and on Sunday mornings from 16th March 1986.

Here's a sneak preview of what's in store:

Magic Cupboard

The topic of this programme is four-year-old Christopher, bright but severely physically handicapped, and his cupboard of magic — a micro-computer, computer programs and controls which enhance his leisure and give him full independence.

The programme also includes the Telephone Exchange, run by Royal National Institute for the Deaf, which enables the deaf with micros/terminals to convey messages to hearing persons without micros/terminals.

Communicating

This concentrates on how the speech-impaired communicate using synthetic speech, print or visual displays. It makes learning to read and write English easier for deaf children and helps them to speak more clearly. It also shows how deaf people can use the telephone, and how the blind can read, take notes and use electronic mail etc.

Learning

This programme deals with how hardware and flexible teaching software help in educating mentally handicapped children to produce neat written work, and the learning process involved in Braille for the blind.

Getting About

Here we learn about how the mobility of a wheelchair is improved by the use of the 'chip'. which can also enable blind people to know which bus is coming, and when, with 'talking bus-stops'.

Working

This covers how light-touch keyboards and word-processing programs can provide jobs for physically handicapped people who work in offices or from home and shows how Optacon with synthetic speech feedback to read documents, made jobs possible for the blind.

Inventing

This details the different types of aid being invented for the disabled, an area in which Britain leads the world.

IBM are running a World Tour exhibition, which I took advantage of whilst it was at York. The mobile exhibition building known as 'The Crystal Arcade', designed by C.A.D., is unique. I strongly recommend anyone interested in computers to try and see this exhibition. I found it very interesting, covering as it does a wide range of micro-technology . . . robotics, lasers, graphics, computers etc. At one stand they demonstrated a speech processing program which helps deaf children to communicate orally with hearing people.

I watched numerous hearing people trying out the equipment with much success. However when I tried out this new fangled technology I was horrified to see how little control I had on the pitches of my voice. Had this facility been available in my school days, I am positive that my speech would be more readily understood. The demonstrator asked me how I learnt to speak and I told him of my precomputer days in speech training which consisted of using inflated balloons and paper strips and the teacher made me hold a balloon which enabled me to feel the vibration produced when we spoke and a strip of paper was held in front of my mouth which moved when one pronounced the letter 'p' etc ... yes, those were the days!!.

By the by . . .

I have recently acquired Auto Dial/Answer board for my Nightingale Modem and hope to give you my assessment of it as soon as I receive the auto answer software.

Time and date of transmissions are as follows:

TITLE	DATE	TIME
CHRISTOPHER'S MAGIC CUPBOARD	Aug 30th	7.45pm
COMMUNICATING	Sept 6th	7.35pm
LEARNING	Sept 13th	7.35pm
GETTING ABOUT	Sept 20th	7.35pm
WORKING	Sept 27th	7.35pm
INVENTING	Oct 4th	7.35pm

RON COMPLEX

Ron Complex is all trussed up and nowhere to go in this weeks upside-down instalment of our micro-mystery serial.

Ron had always said he could do his job standing on his head. Now he intended to prove it. For a few seconds he tried to focus on the forest of feet around him but everything went black.

When he came to the world was still upside down. "Welcome to the Erratic club Mr Complex," said a voice as smooth as silk.

"Funny sort of welcome. What's with the inversion treatment?"

"You will find that at the Erratic club we do things a little differently, Mr Complex."

"Say how do you know my name?"

"While you were taking a nap we took the liberty of emptying your pockets. It was very foolish to leave your Tufty Club life membership card on your person."

"You'd better be careful with that, I need to refer to it in heavy traffic."

"It's quite safe. You, however, are in a rather dangerous predicament. So dangerous that if you do not cease your snooping we will make sure you have an accident."

"I've been threatened by better people than you — whoever you are."

"Ever curious eh, Mr Complex. Well I shall tell you who I am. My name is Dr Demento, founder member of the Erratic Club.

Ron couldn't see the doctor's face but he would know his footwear anywhere. The doctor was wearing one black brogue and a red slip-on sandal.

"Just tell me one thing, why are you trying to foul up the world's computers?"

"It's so obvious Mr Complex. Many years ago I decided that life was becoming too easy. Far too easy. What people needed was a greater element of difficulty in their lives to make them happy. And computers were to blame for making everything so simple. So computers have to be neutralised. It's in everybody's interest surely you can see that?"

Ron grunted. "Of course you do," said the Doctor. "So I've been working to create a more complicated world. You see even common everyday things

can be more complicated. Have you ever read my book "1001 Ways to Boil an Egg?"

"I can't say I have."

"Pity. It's an exciting read."

"So are you responsible for putting all the bugs in the works?" asked Ron.

Dr Demento said nothing. "And what about the RCWG?"

"The what?"

"The Random Code Word Generator?"

Dr Demento remained silent.

After a moment Demento said, "What steps we are taking to tranquilise the computer's menace are classified. We will let you off with a warning this time Mr Complex but if we hear even a whisper that you are snouting for data on us, you will be sorry. Show Mr Complex out will you?"

The door tilted upright and Ron found himself right way up on the outside again. Rex Retina ran across the street and started to untie the ropes. "Do you always get into scrapes like this?" asked Rex.

"It's all in a days work kid," said Ron. "Stay in touch, I've got to find a phone". As Ron set off down the street he felt the blood getting reacquainted with his toes. Above his head a strange contraption hovered silently and followed him to the nearest phone-booth.

Murko put the phone down believe this but there's a machine called a RCWG," shouted Ron down the phone.

"Ah I see," said Murko, wiggling his joystick to manoeuvre his surveillance pod into a better position to see Ron. "Well you'd better get over to Murkotronics right away and tell me about it. Meet me in elevator number nine."

Murko put the phone down and pushed the joystick towards the homeward setting. The screen on which he had been watchin Ron went blank. Murko smiled weakly.

Ron rushed into the lobby of Murkotronics and pressed the button on lift number nine. Ron felt as if he was being watched. He heard the lift door open behind him and took a step backwards. As he fell into the lift shaft and felt himself reaching maximum velocity after a few seconds he thought, "This is the darkest lift shaft I've ever fallen down. I wonder if it's the deepest."

Next week Part 6: It's a long way down . . . . .

Game for a cause

Some months ago me and some of my friends in my class at school decided to do something about our community centre which now owes various companies £40,000. So we got permission from the police to hold a computer games marathon. The idea was that we should play computer games for 24 hours non-stop.

We set a date and persuaded our towns software shop to lend us some games. The response to appeals for sponsorship was very good and as the date drew nearer our headmaster suggested that we take the schools computers and secondly take the day off from school before the marathon. So we did.

The marathon started at nine o'clock in the morning on Friday and ended at nine in the morning the following day. At that time most of us went home, semi-conscious or half asleep. But all in all we enjoyed ourselves and raised £500 between the eight of us for the community centre.

Kieran Ryan, Co Limerick

More swotware

I am writing to express my views concerning educational software (or lack of it) in the shops today. Speaking as a college student I feel strongly that there is a definite lack of educational software for ages 16 and over.

Why doesn't some tired out software house that is flogging its guts out to keep up with the games industry branch out into the world of education. Both the customers and the distributors would be getting satisfaction.

It is true (from what I have read) that one in three houses contain a computer of some sort and I'm sure that many of these houses must contain a student in their teens who are in the process of preparing for examinations.
I am sure they would be overjoyed to see a range of software aimed towards their age group.

There is a great deal of software available for the 3 to 5 age group and from what I have seen they get top ratings. But primary school teachers and parents are present to reinforce the infant's education. Later on in life, there is the saying "it's up to you what you make of your education and life". I am sure parents would feel a lot happier if they knew there was more educational software for their sons and daughters.

I should think that I sounding another thousand voices here!

Andrew Ritson, S. Wirral, Cheshire

Amstrad protector

I am writing to you after browsing over some of my older issues of HCW and reading in issue No 112 a letter that stated that the Amstrad 464 "looked and felt cheap". I would just like to tell one D. Pattendan that the Amstrad CP464 is not a cheap looking computer and there is nothing wrong with the feel of it (I take this to mean the keyboard) as the keyboard has been praised in various mags, even though some would prefer less rattle from the space-bar. Some people, I suppose most people, will say I am biased and maybe I am because I am the proud owner of a green screened CPC 464 and I must say it's been given great support from HCW.

Justin Langan, Argyll

Keep it simple

More and more now, software companies are catering for the more advanced user, in the form of complex megagames (Frankie, Shadowfire and Dun Darach being recent examples). These games are sold, usually, at around £10, firstly because of the development involved, and secondly because of the fancy packaging which seems to be increasingly necessary to sell products nowadays.

The easier, less complicated game is receiving less favourable reviews (e.g. 'Ghost Chaser' in H.C.W. 123), which affects distribution and lowers the availability in shops. Surely software companies should realise there is a gap in the software market for high-quality games which are easy to both understand and play, and so would cater for the expanding number of young users as well.

There used to be a day when you would pay £6 for a game. Prices have risen dramatically, causing problems for the young user, who, if he is willing to spend 90p per week on a game, can buy one per two or three months. He also has the option of buying a budget game, which, with few exceptions, is of a lower quality, which might explain why a high percentage of young users pirate games from their friends. It's an obvious alternative to buying, especially when harm to the industry does not seem particularly relevant to them. In their position what would you do?

David Kelly, Shrewsbury

LETTERS PAGE

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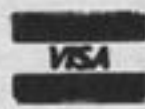
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Invitation to the **TOYMAKER'S PARTY**

CBM 64

This year Rupert celebrates a very special anniversary and as part of the festivities Quicksilva are offering HCW readers a bumper package of Rupert prizes. The first three winning entries pulled from the hat will receive a copy of Rupert and the Toymakers party, Quicksilva's first Rupert escapade in the world of software for the Spectrum and C64, plus an authentic yellow Rupert scarf and a caopy of the anniversary Rupert annual to be published in November.

Twenty two runners up will receive a copy of Rupert and The Toymakers Party, making a total prize value of over £200.

Rupert has been enthralling children of all ages in his cartoon strips for decades but Rupert and the Toymakers Party is his first outing on the home micro. There are 32 screens for Rupert to explore while finding his way through the Toymakers castle to where his friends are waiting to start the party.

To get there Rupert has to collect the invitation cards that have been pinned to the walls of the castle corridors. He can't move on to the next level until he has picked up all the cards he can find.

Every level poses the bear different problems and the toys he meets on his route may help him or delay his arrival at the tea party. There are four different routes that Rupert can use to reach the buns and trifle.

Fortnight Ending August 13, 1985

LAST WEEK	MOVE	THIS WEEK	TITLE	PUBLISHER	SPECTRUM	CBM 64	BBC	ELECTRON	VIC-20	AMSTRAD	ATARI	OTHERS
3	▲	1	Way of the Exploding Fist	Melbourne House		•				•		
1	▼	2	Hypersports	Imagine	•	•						•
2	▼	3	Frank Bruno's Boxing	Elite	•							
5	▲	4	Soft Aid	Various	•	•						
—	NE	5	Frankie Goes to Hollywood	Ocean	•	•						
6	•	6	Elite	Acornsoft			•	•	•			
9	▲	7	Spy Hunter	US Gold	•	•						
14	▲	8	Spy vs Spy	Beyond	•	•						
4	▼	9	Action Biker	Mastertronic	•	•						
23	▲	10	Finders Keepers	Mastertronic	•					•	•	
40	▲	11	Pole Position	US Gold	•	•	•	•		•		
8	▼	12	Jet Set Willy 2	Software Project	•	•						
28	▲	13	Beach Head	US Gold	•	•				•	•	
38	▲	14	Dambusters	Alligata	•	•	•					•
18	▲	15	Pit Stop 2	Epyx/US Gold		•						
7	▼	16	Dynamite Dan	Mirrorsoft	•							
12	▼	17	Cauldron	Palace	•	•						
29	▲	18	Bruce Lee	US Gold	•	•						
15	▼	19	Dun Darach	Gargoyle	•	•				•		
47	▲	20	Red Moon	Level 9	•	•	•					

Up and Coming

Way of the Exploding Fist is back at the top following the launch of the Amstrad version and Big Frank at number three looks as if he might have to be satisfied with being just a contender.

Frankie Goes to Hollywood are making a bid for total domination of the world's charts by going straight in at number 5.

Big climbers this week include Pole Position accelerating up the chart 29 places to number 11, Red Moon leaping 27 places to number 20 and Beach Head jumping 15 slots to number 13.

New entries in the lower reaches of the chart are Nonterraqueous, from Mastertronic, Highway Encounter from Vortex, Short's Fuse from Firebird and US Gold's Bounty Bob Strikes Back.

SPECTRUM

Top Ten

1. Frank Bruno's Boxing
   Elite
2. Hypersports
   Imagine
3. Soft Aid
   Various
4. Frankie Goes to Hollywood
   Ocean
5. Spy vs Spy
   Beyond
6. Dynamite Dan
   Mirrorsoft
7. Spy Hunter
   US Gold
8. Jet Set Willy 2
   Software Projects
9. Pole Position
   US Gold
10. Rocco
    Gremlin Graphics

BBC

Top Ten

1. Revs
   Acornsoft
2. Beach Head
   US Gold
3. Elite
   Acornsoft
4. Combat Lynx
   Durell
5. Knight Lore
   Ultimate
6. Alien 8
   Ultimate
7. Castle Quest
   Micropower
8. Repton
   Superior Software
9. Atic Atac
   Ultimate
10. Mini Office
    Database

COMMODORE

Top Ten

1. Way of the Exploding Fist
   Melbourne House
2. Frankie Goes to Hollywood
   Ocean
3. Hypersports
   Imagine
4. Pitstop 2
   Epyx/US Gold
5. Soft Aid
   Various
6. Elite
   Firebird
7. Action Biker
   Mastertronic
8. Kik Start
   Mastertronic
9. Graham Gooch Test Cricket
   Audiogenic
10. Dambusters
    US Gold

Protect and expand

Daniel Russell from Leeds has two mini programs for the Vic-20. The first is a list proofer to protect your programs from prying eyes.

```
POKE 788,190:REM LOCK
POKE 788,191:REM
    RESTORE
POKE 37150,127:REM LOCK
POKE 37150:REM RESTORE
POKE 808,127:LOCK
POKE 808,2:RESTORE
```

And secondly here's a snippet to let you play a 3K game on a 16K machine.

```
POKE 648,30:POKE 642,32:
    POKE641,0:SYS 64824.
```

''This can also be used on a 16K Vic to use unexpanded locations and their pokes'', says Daniel.

Readers hi-score table

Name	Game	Machine	Score
Lee Thornton	Video Pool	Spectrum	31,640
	Lunar Crabs	Spectrum	12,320
	Steve Davis Snooker	Spectrum	42
	Moon Cresta	Spectrum	29,580
	Manic Miner	Spectrum	85,104
Justin Langan	Sorcery	Amstrad	89,000

Square Route

Each of the symbols H,C,W,! has a meaning — Up, Down, Right or Left — which takes you from square to adjacent square.

If you can find the correct meaning for each sign then you will be able to form a path which starts somewhere along the top row and ends by moving off downwards from the bottom row. Can you find it?
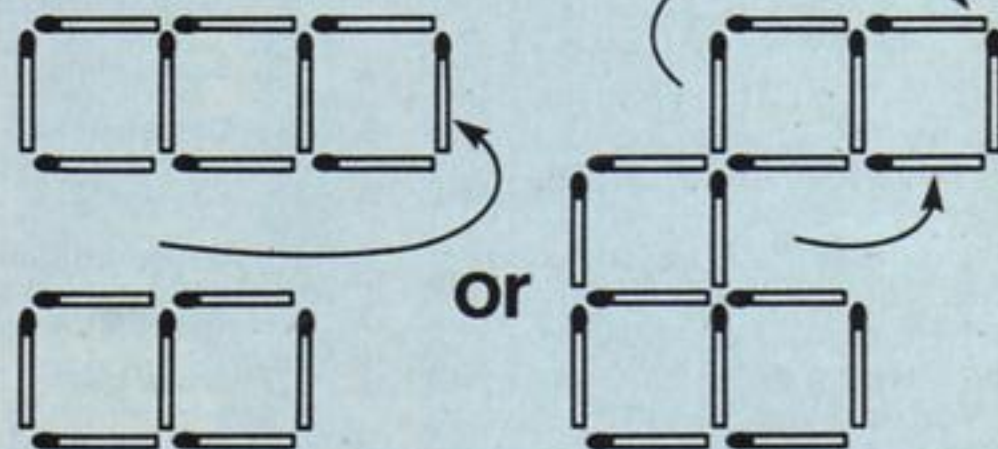
Solution to last weeks puzzle

A — take away two corners, either the left side or the right side and then remove the middle stick on the opposite side: (illustration A)

B — either take the 3 middle sticks lying across the middle (to leave 2 pairs of squares) and make a new square with those three and one of the others or take 2 matches which form a corner and the middle match of the opposite side and make a new square with those plus one of the others: (illustration B)
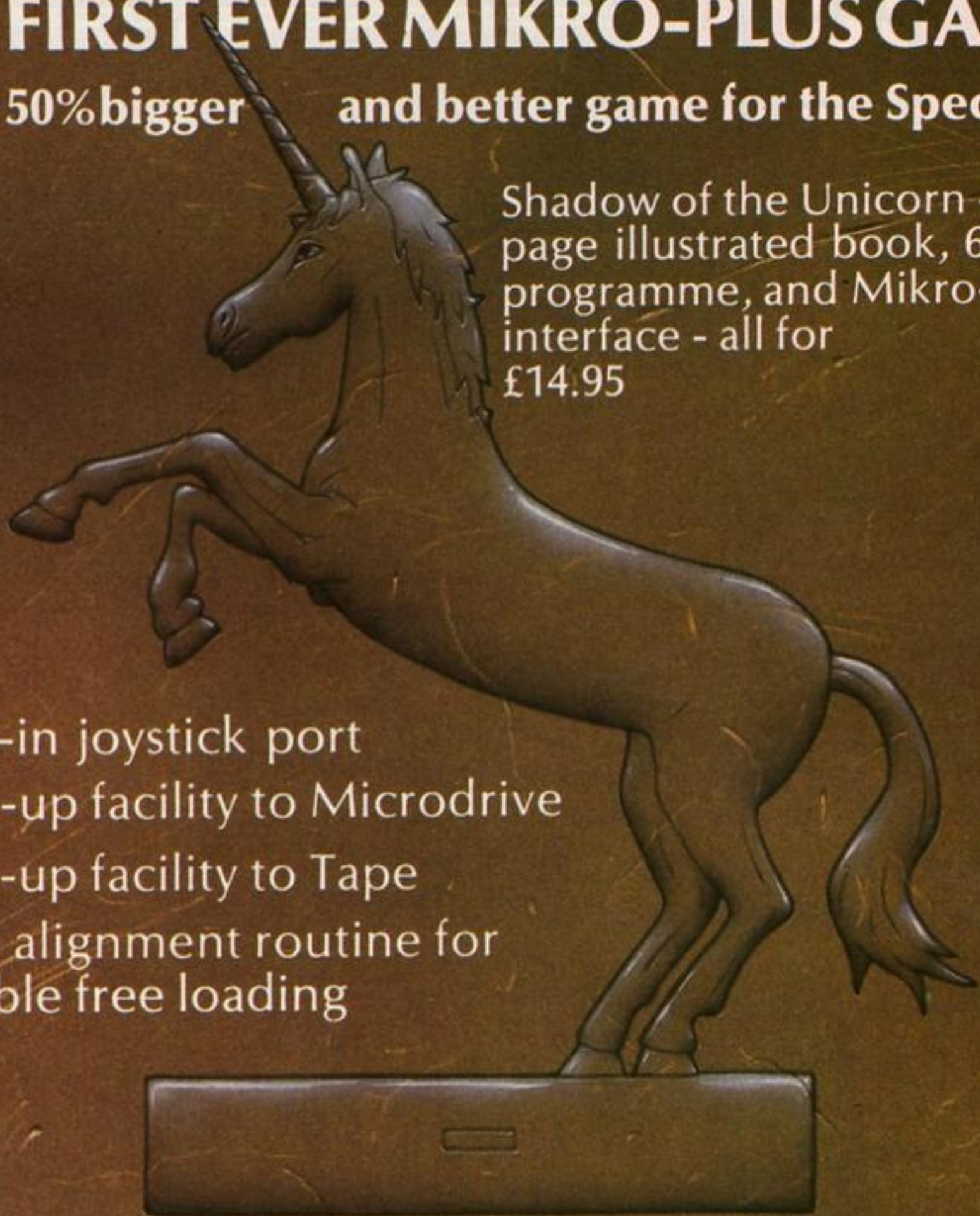

H	C	W	C	!	!	W	H
C	!	!	W	!	!	C	W
!	H	W	!	!	H	C	W
!	H	W	H	H	H	W	!
H	C	C	W	C	H	!	!
H	W	C	W	C	W	H	H
!	W	C	C	H	W	C	C
H	C	C	W	!	!	W	H

	H	C	W	!
Up				
Down				
Right				
Left				